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•THE• VETERINARY• •JOURNAL•

A Monthly Review of Veterinary Science.

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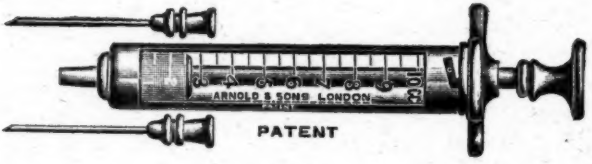

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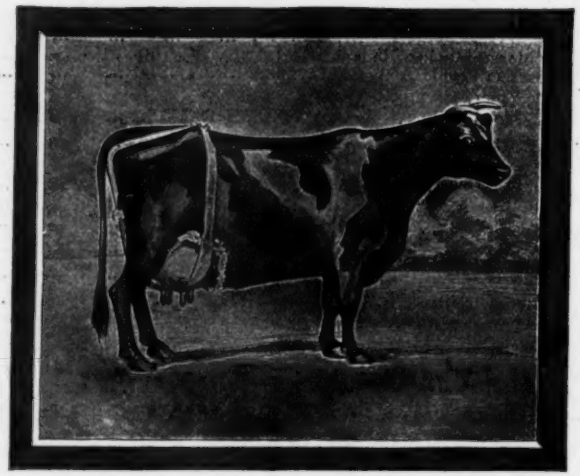

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THE LATE ALBERT WHEATLEY, F.R.C.V.S.

THE

VETERINARY JOURNAL

FEBRUARY, 1910.

THE LATE MR. ALBERT WHEATLEY, F.R.C.V.S.

It was with sincere regret that we previously announced, in our December issue, the death of our esteemed friend Mr. Albert Wheatley, of Reading, in his fifty-sixth year. Mr. Wheatley was born, as it were, into the veterinary profession, his father being a veterinary practitioner in Reading. Mr. Albert Wheatley took his diploma at the Royal Veterinary College, London, in 1876, and was at once taken into partnership by his father. He was extremely successful as a practitioner, and soon obtained the full confidence of his father's *clientèle*. He took his Fellowship Degree in 1885. He then looked for a larger field for his energies, and was twice President of the Royal Counties Veterinary Medical Association. He was elected to the Council of the Royal College of Veterinary Surgeons in 1891. He retired from that body after three years, and later, in 1901, he was elected Examiner for the Class B Examination of the Royal College of Veterinary Surgeons in the subjects of Stable Management and the Principles of Shoeing, which appointment he retained until his death. Mr. Wheatley had specialized in the subject of the shoeing of horses, and, in collaboration with Mr. Dollar, he produced our best standard work on the subject, entitled "On the Foot of the Horse, and Shoeing." He officiated as judge at shoeing competitions in many parts of the country, and at various times he acted as veterinary surgeon at the horse shows at Islington held by the Hunters' Improvement Society, the Shire Horse Society, and the Hackney Society.

Mr. Wheatley will be much missed by the members of his profession in the South of England and by the teachers at the veterinary colleges, while the examination candidates have lost a kind, sympathetic, and just friend.

Editorials.

THE CAUSES OF COLIC IN HORSES.

GENERAL SMITH has given us much to think about on the above subject in his last annual report, a portion of which we reproduce in this issue. He has had nearly eight hundred non-fatal cases of colic and almost a hundred fatal cases during the year on which to form his opinions, and his statistics are highly instructive. For example, he has been able to show that, in army horses at any rate, colic is much more prevalent during one portion of the day than the other, namely, from 5 a.m. to 9 p.m., and that the worst time of all is between 4 p.m. and 6 p.m. He then considers what circumstances occur during the "colic day" which may be concerned in the production of the colic. Undoubtedly the main events during that period are watering, feeding, and working, all events which are not connected with the non-colic day of from 9 p.m. to 5 a.m. Those three factors are then investigated. In General Smith's own words, "the irresistible conclusion from the observations is that watering exercises an enormous influence over the production of colic and atal disorders of the stomach and intestines." In fact, over 80 per cent. of the non-fatal cases and about 70 per cent. of the fatal cases occurred after watering. Then as to the influence of work, 76 per cent. of the fatal cases and of the non-fatal cases had been at work on the day of the attack. The similarity of the percentages associated with watering and with work is really very striking, and to us it is significant. It would certainly suggest to us that there is a direct connection between the combination of the two events and the onset of colic.

It would certainly support our opinion that colic is frequently due to allowing horses to take copious draughts of cold water when coming in from work in a more or less exhausted condition. In support of that opinion is the fact that most cases occurred after the horses were brought in from work (not during

work), and during the period of manœuvres, *i.e.*, when exhaustion would be greater. On the other hand, our experience in the hunting districts of Cheshire and Leicestershire is that colic is not very common amongst hunters (unfortunately we have no figures to go upon), and horses coming home very exhausted after their day's work, and this we attribute to the custom of withholding cold water and giving warm oatmeal gruel instead.

There is one other rather important probable cause of colic to which no reference has been made, viz., entozoa. It would have been both interesting and instructive if the number of fatal cases had been noted in which intestinal parasites were observed on *post-mortem* examination. In the list of deaths we observe only one case in which death was attributed to entozoa, though fifty horses were treated for the presence of these pests.

It is practically impossible to say how many non-fatal cases are complicated with or caused by worms, but we are of opinion that the number is far from insignificant, especially when one realizes the vicious nature of the sclerostomes and the sometimes enormous number of ascarides present.

General Smith concludes with advice which is excellent, and which if followed would, we are sure, considerably reduce the number of cases of colic. He says: "The colic of work may yet be shown to be due to the intervals of feeding being too great, or to the large amount of water consumed. During a long march or a long day's operations horses should be watered as frequently as possible, and fed, if for only five or ten minutes at a time." In this way a horse will be enabled to get his food distributed throughout the day, and not, as so often is the case, be kept short during the day and be expected to make up for it at night with impunity. The anatomy of the digestive apparatus of the horse and his natural habit of almost continuous feeding are sufficiently strong arguments to show the reasonableness of the advice to "feed little and often."

THE INDIAN CIVIL VETERINARY DEPARTMENT.

THE Imperial Bacteriologist to the Government of India (Captain J. D. E. Holmes, D.Sc., M.R.C.V.S.) has just issued the first scientific memoir of the Indian Civil Veterinary Department. It is a very excellent report of the research work done in the Imperial Bacteriological Laboratory for 1908-09, and we give an instructive abstract elsewhere in this issue. Previous reports have been limited to a short statement of the administration of the institute, the amount of sera and vaccines prepared, and a mere mention of the diseases under investigation. The main object of the Laboratory is primarily to supply sera and vaccines to the Civil Veterinary Department for the treatment and control of infective diseases of animals throughout India; and, secondly, to investigate diseases of animals. There is no doubt that the results for the first purpose have been eminently satisfactory, as may, perhaps, be judged from the fact that nearly three-quarters of a million doses were issued from the Laboratory during the year. As might be expected, the enormous amount of work entailed has been a tax on the staff, and has left comparatively little time for research work. There are many diseases in India of which we know very little, and work concerning them must be done on the spot. It is therefore a great pity that the staff of this Laboratory should be short-handed. The Director should be free from routine work beyond merely superintending it—such work can well be carried on by capable assistants—and he should be free to devote most of his time to research. That such a policy would pay is clearly shown by the results obtained even under existing difficulties. After reading the abstract on pages 108-109 we are sure our readers will agree with us that the Indian Civil Veterinary Department is working on excellent lines and doing much to improve and increase the value of the animal population of that vast Empire.

General Articles.

COLIC AND DISEASES OF THE DIGESTIVE SYSTEM.[1]

By GENERAL FRED SMITH, D.S.O.,

Director-General of the Army Veterinary Service.

In the last Annual Report prominence was given to the important subject of colic and fatal disorders of the digestive system. During the year which has since elapsed every effort has been made to enquire into the causes operating in the production of this peculiar class of affection, the existence of which amongst animals is almost entirely confined to the horse.

A system of collective investigation has been adopted, every case of colic or fatal disease of the digestive system being separately reported upon, and a series of questions answered. The result of these enquiries is now presented.

Speaking broadly, diseases of the digestive canal of the horse are generally spoken of as colic. Colic, as a matter of fact, is only a symptom of abdominal pain; it is present whether the affection is a simple cramp of the bowels, or whether the lesion is of a fatal character, such as a rupture of the intestine. It is owing to this fact that the layman gets confused in the use of a term which sometimes indicates a mild, at other times a fatal, condition.

In these returns the term "colic" is restricted to cases of bowel or stomach pain which recovered. All cases which died, no matter whether from inflammation, rupture, twist, or impaction, are spoken of simply as fatal disorders of the digestive canal; in this way without sacrificing accuracy we ensure simplicity.

One-third of all the deaths in the army, and over 4¼ per cent. of the admissions to hospital for the year, were caused by the above disorders, and day by day there were never less than seventy horses under treatment for these affections. In the presence of these facts the importance of a searching enquiry into the causes needs no further comment.

During the year under review there occurred 777 cases of colic, and ninety-two fatal disorders of the digestive canal. The percentage of colic on the average strength of horses was less than last year, but is still too high. Here are the figures for the last four years:—

1905	...	3·37	per cent. of strength.
1906	...	3·79	,, ,,
1907	...	4·35	,, ,,
1908	...	3·72	,, ,,

These figures do not include any fatal cases.

[1] From his Annual Report.

The distribution of colic by commands was as follows:—

	Colic only. Per cent. of average strength.	Colic and Fatal Disorders. Per cent. of average strength.
Scottish Command ...	9·59 ...	10·46
Aldershot Command ...	4·62 ...	5·16
Irish Command ...	4·34 ...	4·75
Eastern Command ...	4·14 ...	4·46
Southern Command ...	3·53 ...	3·94
London District ...	2·96 ...	3·72
Northern Command ...	2·85 ...	3·19
Western Command ...	1·70 ...	1·70

In this table the great excess of colic in the Scottish Command is very striking. Making every allowance for the error arising from the use of small numbers, it is still evident that these diseases exist in a far higher proportion than should be. Every tenth horse in the Scottish Command was admitted during the year. Further, the proportion of fatal cases was the highest in the Army. The Aldershot Command has about half the admission and death ratio of the Scottish Command; the Irish, Eastern, and Southern Commands follow; the London District furnishes a low admission rate, but a death rate the second highest in the Army.

If the colic and fatal diseases of the digestive system be examined by branches of the Service, the following table is obtained:—

	Colic.	Fatal Disorders.
Mounted Infantry ...	·46 per cent.	·23 per cent.
Household Cavalry ...	1·13 ,,	·88 ,,
Royal Horse Artillery ...	3·30 ,,	·13 ,,
,, Engineers ...	3·93 ,,	·79 ,,
,, Field Artillery ...	5·21 ,,	·45 ,,
Army Service Corps ...	8·07 ,,	·89 ,,

The low colic percentage of the Mounted Infantry is a point of importance, and the question suggests itself whether cobs are so liable as horses. It certainly appears that draught horses are more liable than riding horses, but this point can only be decided by extended enquiry.

The monthly prevalence of colic has been studied, and though considerable variation occurs from month to month, yet July stands out as the worst month of the year. If the year be divided into six warm months, April to September, and six cold months, October to March, it is found that more cases of colic occur during the warm than during the cold months. The seasonal influence is, however, much more marked in the incidence of fatal cases; there are more fatal cases during the summer, July and September furnishing the two months of highest mortality.

The explanation of the higher admission and mortality rate in summer is that colic and fatal disorders of the digestive system are not entirely brought about by water or food, but that work is a factor. To this point we shall return.

For years it has been known that colic is more frequent at certain hours of the day; in consequence the influence of the time of day in the production of colic has been carefully observed in the whole of the 777 colic cases and ninety-two fatal cases of disease of the digestive system recorded during the year. These results are of the greatest practical importance; they demonstrate in the daily life of the horse what may be described as a colic storm, which lasts sixteen hours. This begins at 5 a.m. and ends at 9 p.m., the height of the tempest being reached between 4 p.m. and 6 p.m. The disturbance snbsides at 9 p.m., and from then until 5 o'clock next morning there is comparative calm, lasting eight hours. Thus, there is in the life of horses a colic day of sixteen hours. The cause of this we must now attempt to arrive at.

The events of the colic day which alone can have any influence in the production of the disease are water, food, and work; the events of the non-colic day (night) are rest, and practically no food. Evidently water, food, and work are far more concerned in colic production than rest and abstinence.

The water a horse drinks does not stop in the stomach, for the latter is so small it could not contain it; the fluid as it is drunk passes in at one end of the stomach and out at the other, and travels to a special receptacle by means of a tube 72 ft. in length; this tube is the small intestine, and the water takes from five to fifteen minutes to travel its whole length, while it takes food at least five hours to travel the same distance.

A thirsty horse may drink as much as 3 or 4 gallons of water, and this mass sweeps through the stomach and small intestines, in the latter carrying in its rush everything before it.

With the above fact before us, it becomes an important point to determine the proportion of colic cases which occur before and after watering. This is shown in the following table:—

	Attacked before watering.	Attacked after watering.
Colic cases	19·43 per cent.	80·57 per cent.
Fatal	30·43 „	69·57 „

The significance of "watering" is here very marked; over 80 per cent. of the colic cases are attacked after the horse has been "watered."

It is now important to see how far this is maintained throughout the twenty-four hours. For this purpose we have divided the day into eight groups of three hours :—

	Colic cases		Fatal cases	
	Before water	After water	Before water	After water
1 a.m. to 4 a.m.	0	6	0	2
4 „ „ 7 „	26	19	14	10
7 „ „ 10 „	12	83	7	5
10 „ „ 1 p.m.	36	113	6	11
1 p.m. „ 4 „	10	119	0	5
4 „ „ 7 „	60	191	0	23
7 „ „ 10 „	3	82	0	4
10 „ „ 1 a.m.	0	17	0	5

The table shows that from 4 a.m. to 7 a.m. both colic and fatal cases were more liable to attack before than after water, but that may be due to the fact that the large majority of horses would be watered after 7 a.m.

From 7 a.m. to 10 a.m. the influence of water is very marked, seven times as many cases of colic occurring "after" as compared with "before" watering. The fatal cases at this period still show an excess among those that have not watered over those that have.

From 10 a.m. to 1 p.m. there are three times as many cases of colic "after" as "before" water, and for the first time there are more fatal cases among the watered as compared with the unwatered horses. From 1 p.m. to 4 p.m. there are eleven times more colic cases among the "watered" horses; from 4 p.m. to 7 p.m. four times as many; from 7 p.m. to 10 p.m. twenty-seven times as many; and from 10 p.m. to 1 a.m. seventeen times as many. Strange to say, among the fatal cases not a single horse was attacked "before" watering after 1 p.m. in the day.

The irresistible conclusion from these observations is that "watering" exercises an enormous influence over the production of colic and fatal disorders of the stomach and intestines. The question is, How does it act? To this the only reply is that its action must be mechanical, sweeping out the imperfectly digested contents of the stomach, which consequently set up irritation. Under natural conditions a horse is practically always eating, and the small size of the reservoir known as the stomach explains the necessity for this. He will eat nearly throughout the whole day and night, broken only by extremely short periods of sleep, and he drinks when he feels thirsty. Under the conditions of domestication he has to eat, but more particularly drink, at those times when it is convenient to give it. He cannot always be feeding, as he is required for work, and the food he should take twenty-four hours to consume is compressed into the working day

of twelve hours. The arrangements necessitated by having to place horses in stables are not suited to the peculiarities of the animal's digestive apparatus, which demands little and often. When we see the nosebag being put on the horse in the streets the moment he comes to rest, we have no difficulty in recognizing that the principle of "little and often" is being intelligently carried out.

But water is not the whole explanation of colic and fatal disorders of the digestive system, for 20 per cent. of colic cases and 30 per cent. of fatal cases occur before watering. Work as a cause of colic and fatal digestive disorders is quite undoubted; whether its effects are produced in consequence of work suspending digestion, or whether it be due to the actual strain of work acting mechanically on the digestive canal, cannot be stated, but the fact is undoubted; 76·8 per cent. of the horses attacked with colic were known to have worked on the day of attack, and 23 per cent. were idle. Strange to say, practically the same proportion was observed among the fatal cases; 76 per cent. had been or were at work, and 24 per cent. idle.

If the working day of the army horse be taken as extending from 7 a.m. to 1 p.m. we should expect, if work were a factor in the production of the disease, to find more cases of colic occurring in the working than in the non-working day; but as a matter of fact it is not so. Between 7 a.m. and 1 p.m. 273 mixed cases of digestive disorder occurred, while from 1 p.m. to 7 p.m. 398 seizures took place. Yet it may well be that disturbance set up by work in the morning might not develop until the afternoon, especially if these processes were of a chemical nature. Further, the major part of the colic and fatal cases occur in the late summer, the period of manœuvres, when afternoon work would be taking place.

The seasonal prevalence of colic might also be explained by the amount of water consumed, but we believe it supports the view that work is a factor, the only difference between the summer and winter life of the army horse being that he does more work in the former. Our impression is that draught horses are more liable to colic and fatal disorders than riding horses, and the figures available this year support that view. If extended enquiry should prove this to be the case, it still further strengthens the case against severe muscular work as a cause.

There is equally good reason for believing work to be an important cause of fatal cases of the digestive system.[1] Yet again, when sub-

[1] These fatal cases are remarkable for the peculiarity of the lesion. The stomach of the horse bursts as if struck by a shell, or the intestines rupture just as if they had been deliberately torn by hand. More remarkable still, the bowels tie themselves in a knot of such complexity that even at *post-mortem* examination they frequently cannot be untied. In no other animal than the horse have such lesions been described.

mitted to the test of the figures available, very little support is given. During what we have spoken of as the working day, 7 a.m. to 1 p.m., twenty-nine fatal cases occurred, while twenty-eight were attacked during the non-working day. On the other hand, as just pointed out, the majority of fatal cases occur in the late summer, at a time when afternoon work is being performed.

Very few fatal cases are attacked between 7 p.m. and 4 a.m. This is naturally a period of repose. On the other hand, there is quite a violent outburst between 4 a.m. and 7 a.m., the chief intensity of which is between 6 a.m. and 7 a.m. This cannot be due to work, though it might be due to water. The figures of the 4 a.m. to 7 a.m. outburst are very remarkable; out of a mixed total of sixty-nine cases which occurred during that hour no less than twenty-four proved fatal, while out of 264 mixed cases seized between 4 p.m. and 7 p.m. only twenty-three proved fatal. Any explanation of the remarkable outbreak between 6 a.m. and 7 a.m. cannot for the present be attempted.

On an average there are four times as many fatal intestinal as stomach cases, but the proportion between intestinal and stomach trouble grows less and less as the day advances. For instance, in the morning the proportion is 8 intestine to 1 stomach; at midday 3·5 intestine to 1 stomach; and in the evening 2·4 intestine to 1 stomach.

The tables which are appended to the report show that the fatal cases included: stomach affections 15 (rupture 14, impaction 1), enteritis 13, volvulus 18, ventral hernia 2, intussusception 4, impaction of intestine 3, strangulation 10, rupture of intestine 14, calculus 3, diarrhœa 1, peritonitis 7, rupture of liver 1, entozoa 1.

In attempting to deal with the question of prevention, we must consider the three main features in the life of the horse, viz., water, food, and work.

By watering horses more frequently, say four instead of three times a day, less will be consumed at a time, and if our reasoning is sound this should be productive of benefit. But unless we adopt the system of always keeping water before the horse, it appears impossible to avoid washing a portion of one or more meals out of the stomach.[1] It is certainly avoided at morning water, a period when, unfortunately, although the channel is clear, many horses drink very little. It is just possible at midday water to avoid washing out portions of the morning feed, but it seems impossible to avoid it in the evening. If it is not

[1] Since this was written the Commandant, Mounted Infantry, informed me he always keeps water by his cobs. How far does this explain their comparative immunity to colic?

avoided, then it appears possible that horses become tolerant of the process of imperfectly digested material being washed into the intestines, otherwise it is difficult to explain why 96 per cent. of the animals escape a whole year without an attack of abdominal pain.

And so with feeding; a twenty-four hours' supply has to be given in twelve hours, and safely conducted through a small bag incapable when crammed of holding more than one-fifth of the total daily ration. That it does not fail more often is somewhat surprising, but the adaptability of the body is one of its strong features. The principle of "little and often" embraces the golden rule in feeding horses. The colic of work may yet be shown to be due to the intervals between feeding being too great, or the large amount of water consumed. During a long march, or a long day's operations, "little and often" should be practised; horses should be watered as frequently as possible and fed, if for only five or ten minutes at a time. This will enable an animal to get through much of the day's ration without an undue accumulation for the evening, and no ill consequences need be expected when work follows a light feed. The cab horse in this matter forms an excellent guide; he should be followed in preference to the racer or hunter.

More colic cases occur on a Wednesday and fewer on a Sunday. Wednesday is a half-holiday, and the excess of colic on this day might mean want of care or want of supervision, but Saturday is also a half-holiday and no excess is shown on this day. On Sunday we should naturally expect fewer cases if the previous reasoning we have brought forward is sound, but the number of observations are at present insufficient to admit of any definite conclusions being drawn.

There are certain horses liable to colic, *i.e.*, greedy feeders, "wind-suckers," or animals the bowels of which contain foreign bodies, sand, calculi, &c.; but after every possible cause has been exhausted there are still 70 per cent. of fatal cases of the digestive system for which no primary cause can be assigned, nor discovered on *post-mortem* examination.

Indexed B. A. I.

STERILITY OF THE COW AND ITS RELATION TO INFECTIOUS DISEASES OF THE GENITAL ORGANS.[1]

By Dr. E. HESS.

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Diseases of the genital organs belong to the most frequent and important ailments of the cow, their number in this ambulatory clinic during the last twelve years averaging 1,200 to 1,400 per annum, or 35 to 40 per cent. of all ailing cattle brought in for examination. These striking facts account sufficiently for the frequent complaints of our cattle-owners concerning the sterility prevailing among their herds, as well as for the money expended, and puffing indulged in concerning "unfailing pregnancy producers."

As a ground-work of what ensues we have been observing and explaining the sterility of the cow for twenty-five years in the ambulatory clinic, and have made observations in many thousands of cases; further, we published the work, "Report by the Swiss Veterinary Surgeons Society on the Examinations Conducted in the Nodular Disease" (*die Knötchen seuche*), Bern, 1905, and "The Sterility of the Cow" (*Schweizer-Archiv für Tierheilkunde*, p. 351, 1906), as well as recorded statistics, forty in number, on 300 cows, with the special object of ascertaining the causes of sterility of the cow. The reasons why the statistics, in spite of the trouble and time expended and the plentiful supply of clinical material did not comprise more cases are as follows: Firstly, all those numerous histories of illness with uncertain or faulty anamnesis were eliminated, and secondly, in every case of illness notes on the question at issue were not possible. The 300 clinical cases observed by us were those in which the form of the illness was verified and noted at the time, and in which a diagnosis of the true nature of the cause of the sterility of the cow as evinced in our neighbourhood was justified.

It is generally accepted by practising veterinary surgeons in the country here that the prevalent use of artificial manure and feeding stuffs, especially the great employment of rye, barley, maize, barley meal, grains, and malt, as well as deviation from natural maintenance, constant housing, and so on, favour the production of this complaint. In the year 1829 Meyer touched on this question, and Solothurn wrote on "Non-pregnancy of the Cow."

According to our statistics sterility is generally most frequent in

[1] Presented at the Ninth International Veterinary Congress at The Hague, September, 1909.

pure-bred, early matured milk and breeding stock, constantly housed, especially in neighbourhoods and farms with intensive milk and feeding management. In naturally fat and tended animals with a robust constitution and greater vital energy acquired by exercise and grazing in the fields, sterility is much rarer than where great milk secretion is aimed at and the activity of the fœtus-bearing organs weakened, consequently diseases of the genital organs and sterility occur more readily in stall-confined animals. Besides, it is not wise to depreciate the numerous specific and non-specific infections of the genital organs which are favoured by stalling, trade, and traffic.

From what precedes, it follows that sterility of the cow has been etiologically divided in veterinary literature into: (1) Specific and plainly *non-infectious* disease of the genital organs; (2) a specific *infectious* form arising *through infection* of the genital organs.

I.—Non-infectious Diseases.

According to Zchokke's schematic collection of the causes of the unfruitfulness of the cow (*Landw. Jahrbuch der Schweiz*) and our own observations, non-infectious sterility of the breeding animal occurs under the following conditions:—

(1) *In the Male.*—(*a*) *In bodily unfitness* arising from too young and too old age, debility, fattening, painful conditions in the joints (arthritis, sore hock-joints), in the claws (foul, foot soreness), or muscles, so-called loin weakness, and relative smallness of the bull.

(*b*) *In lack of desire to mount*, generally due to illness (fever, indigestion, chronic tympanitis, diarrhœa, brain trouble), complaints (painful conditions), and malformation of the genital organs, great bodily fatigue, over-use (over-leading), enervating or insufficient nourishment (grains, maize), too high feeding and lack of exercise, incomplete acclimatization, individual aversion, and the at times over-joy accompanying a jump too long held back, leading to casting away of the seed (onanism).

(*c*) *In Unfitness at the Covering Act* (*Mating Impotence*).—Diseased conditions of the genital organs, warts, inflammations, thickenings, wounds and cracks of the penis, as well as closure, tumefaction and other affections of the vagina.

(*d*) *In Inability to Fructify* (*Procreation Impotence*).—Genital malformations (hermaphroditism), incompleteness, calcination, swellings of the genital glands, aspermia, aroospermia, non-acclimatization, exhaustion, old age, too early and too lustful employment in breeding, in-and-in breeding, insufficient nourishment and care, bodily pro-

tuberance, fatness in youth. Impotence in a male animal is as a rule declared when a normal cow has been covered with no result (unrest of the animal, disproportion of the parts, sunken vagina, &c.). In this case the practical man has a healthy cow covered again, or tries to breed with a different animal before he declares either the male or female unfruitful.

(2) *Causes in the Female.*—(*a*) When the œstrum (bulling, coming in season) is deferred or quite absent.

(i.) *General Causes.*—Immaturity, great age, atrophy of the ovaries due to old age, fatness, phlegmatic temperament, continuous housing, at the beginning of food and dwelling changes, general nourishment disturbance (too small or large absorption into the system), bad care, stringy, enervating nourishment, cold, wet, tasteless food (poor grass), digestive disturbances of all kinds that lead to lack of appetite or laxity, great milk production (after the act of parturition), muscular exertion, general illnesses, infections (tuberculosis), fever, cold, organic disease of the brain, liver, kidneys, as well as painful conditions, cachexia (pyemia, cancer), all too long non-satisfaction of desire, certain medicines (narcotics).

(ii.) *Special Changes in Regard to the Genital Organs.*—Congenital malformation (hermaphroditism) or genital functional weakness (in consequence of the incestuous intercourse), degeneration of the ovaries through cysts, tumours (cancer, tuberculosis), chronic inflammatory processes (sclerosis, cicatrization), non-development of the yellow bodies (in consequence of abnormal feeding), diseased condition of the womb: retained dead fœtus, mucous or purulent fluid, catarrh of the mucous membrane of the womb (leucorrhœa).

(*b*) *If the Œstrum is too Weak.*—The intensity and continuance of the appearances of normal œstrum are individually different. Close observation is essential as well as instruction of the attendant. The appearances of œstrum are scanty; in weakened individuals (in consequence of great milk production, work, food badly absorbed, illness, continuous stalling, insufficient and fibrous food), not suitable acclimatization.

(*c*) *If Rutting Occurs, but Conception is Wanting.*—(i.) If œstrum occurs regularly every three weeks but conception is absent, mechanical hindrances at copulation, small breeding animals, sunk-in vulva and vagina. Unrest in consequence of anxiety (heifers), tumours, cicatricial strictures in the vagina. Further in too copious œstrum; full-blooded animals, too strong nourishment, too early leading, great sensitiveness in the vagina, injuries through which straining and

pressing occur, os uteri remaining open, lodgment of mucus in the vagina (acid reaction?), closure of the mouth of the womb, too late mating, enlargement of the lips of the os uteri; vaginal catarrh, erosions, painful conditions of the womb (sclerosis, calcification of the cotyledons, closure of the Fallopian tubes).

(ii.) Œstrum occurs too frequently or continuously. Whether injuries of the brain or clitoris, or chiefly those of the birth-tract, lead to this is uncertain. In rare cases too frequent coming in season may be noticed in normal animals. As a rule one considers it due to diseases of the ovaries—cystic degeneration, dropsy of the ovary, acute tuberculous inflammation of the ovary.

(*d*) *If the Animal Conceives, but the Fœtus does not come to Maturity* (*Abortion*).—(i.) In consequence of abnormal position or development of the young—malformations, pressure on the navel string, &c.

(ii.) Death of the fœtus in consequence of an infection of the vagina—contagious abortion.

(iii.) General feverish illness of the mother—infectious illnesses.

(iv.) External influences acting directly or indirectly on the womb—blows, thrusts in the groin (narrow stalls), ill-treatment (blows on the nose), violent falls, incautious rousing, abnormal way of getting up, great fatigue, fright, cold (especially through cold food and drink).

(v.) Poison, purgatives, spoilt food.

Whilst many of these nominal causes have been investigated and are only established as such on account of general symptoms or certain conclusive observations, others, such as the exhaustion of breeding animals, dominant influence in pregnant animals, are withheld for further consideration.

It is not a matter of doubt that lack of desire and impotence, as well as some ovarian and uterine diseases, as cystic degeneration of the ovaries, mortification and maceration of the fœtus, abortion, *endometritis catarrhalis aut purulenta chronica und lyometra*, occur equally in non-infected and infected genital organs, and declare themselves by quite similar symptoms, on which account their certain etiological significance is at times surrounded with great difficulty; but with the improvement of present-day clinical methods of examination (bacteriological examination and inoculation of preputial and spermatic secretion, vaginal speculum and spectroscope, bacterial examination and inoculation of the vaginal, cervical, and uterine secretions, which are suitable for *vaginitis follicularis infectiosa*, benign vesicular disease, and tuberculosis and retraction of the mouth of the

womb), the number of these etiologically doubtful cases will always become smaller.

II.—Infectious Forms of Sterility.

Under infectious illnesses of the genital organs may be named benign vesicular disease and tuberculosis of the genital organs, especially of the uterus, which is rare. They need no special mention here. Of the latter complaint we have had a yearly average in our clinic of one to two cases of ovarian and four cases of uterine tuberculosis which were diagnosed.

Under infectious illnesses of the genital organs the greatest etiological importance attaches to contagious vaginal and uterine inflammation, and it is a disease by far the most frequently brought to our notice. Synonymous terms are "bösartige chronische Bläschenseuche" (Hess), "Knötchenseuche" (Iseppoin), "Knötchenauschlag," "austeckender Scheidenkatarrh" (R. Fröhner and Martens), "Vaginitis et Metritis follicularis infectiosa" (Hess), Vaginitis infectiosa granulosa, Vaginitis verrucosa (Trommsdorft), Vaginitis granularis infectiosa bovis (Raebiger), Colpitis granularis infectiosa (Ellinger), Vaginitis follicularis, "Colpitis follicularis," Collitis follicularis infectiosa (E. Fröhner), "Vaginite granuleuse de la Vache," "Vaginite infectieuse ou contagieuse."

In seventy years of the preceding century this disease has been observed in certain parts of Switzerland. Highly interesting investigations have been made by Ostertag, who found in the vaginal secretion a diplococcus and short streptcococcus. The above-mentioned report by the Swiss Veterinary Surgeons' Society on the nodular disease was of great interest from a national, economic and breeding point of view, as the complaint occurs frequently enough in our practices, though it is rarer, thanks to the intelligent foresight of the cattle-owner, and especially the breeder, than it was during the years 1903 to 1906.

According to the statistics of the Swiss veterinary surgeons got together in 1903 and 1904, the number of male animals attacked was much smaller than that of the females. Altogether 344 cowhouses with 4,322 (4,207 female and 115 male) animals were examined. Of these 1,727, or 40 per cent., were declared healthy, and 2,595, or 60 per cent., were found to be infected. Of the females 1,667, or 40 per cent. were healthy, and 2,540, or 60 per cent., infected.

The infected female animals included 340 far advanced in pregnancy, 506 pregnant under 16 weeks, 116 non-pregnant, 395 never

covered, 131 affected with abortion. The non-infected consisted of 934 in calf and 733 not so. Of the bulls, 60, or 52 per cent., were healthy, and 55, or 48 per cent., infected. In the 344 byres examined, 1,780 head were in calf and 2,427 non-pregnant.

Of the pregnant animals, 846, or 48 per cent., were infected; 934, or 52 per cent., healthy. Consequently infection had spread to nearly half of the in-calf cows examined.

Vaginitis follicularis infectiosa may occur both as an enzootic and epizootic, and in many cases is strikingly frequent on account of infection of the bulls in 75 per cent. of cases chronically and in 25 per cent. acutely. Whatever its relation to the procreativeness of breeding animals, our numerous observations establish the fact that the male organs may be severely affected without one being in a position to observe any external changes. Complaints of the unfruitfulness of breeding animals and of the infection of cows by the above-mentioned animals are general in certain districts, especially during the early spring and summer, and there are infected steadings in which in single years the pregnancy figure is only 5, or 20 per cent.; indeed, in the course of the last nine years we have noticed a fact very fatal to good husbandry, *i.e.*, that in farms of five to sixteen head not one animal has been pregnant in the late summer. Very often infected animals or those that have been infected show diminished desire to cover, and after two or three infections inability to cover and powerlessness to fructify (impotence).

With regard to procreativeness, we have noticed that this can fail in spite of very energetic covering, and that chronically affected as well as clinically treated and healed animals jump one another very violently and quickly without producing young. This we attribute to long-continuing hyperæsthesia of the genital organs. In consequence of the abnormal and rough coitus the female animal is so torn that for several hours after copulation she presses and strains violently. This fact is erroneously considered by the owner to be quite normal in breeding animals.

We have further noticed several times that young and old animals, if only having suffered from one severe attack, and after healing of the complaint will exhibit lack of desire to jump, or the covering act will be performed more slowly, or the female well covered does not sink down at the time. In consequence of the long drawn-out coition small and medium sized cows, especially if weak in the back, will collapse—a case of being "over-ridden." Conception not occurring, a repeated jumping is necessary. In young bulls lack of desire to jump and

impotence are only transitory, this lasting until swelling of the penis, in consequence of acute infection, declines. Experience teaches that with careful therapy and four to six weeks' cessation of serving the covering act can again be performed with its usual briskness.

Another observation made for years has established the fact that freshly infected young animals and those that have been longer infected, whose procreativeness has been considered healthy, but which have been infected by a diseased bull, almost regularly abort in the first three to twelve weeks of pregnancy—contagious abortion. Another fact is interesting, in that lined cows infected by old diseased bulls, now apparently healthy, exhibit a purulent vaginal discharge six, nine, twelve to twenty-one weeks after the covering act, this being accompanied by death of the fœtus, maceration of the same, and *endometritis purulenta chronica.* Whether this is due to early exhaustion of propagation capacity (senescence), or to the infected seed being driven back by the remains of the nodular disease, has not yet been decided. Uncertain also are the etiological connection between nodular disease and the visible emaciation noticeable in affected animals, the thickening of the vaginal mucous membrane, strictures, and hæmorrhages from the vagina, vaginal abscesses, cystitis and nephritis, as well as necrosis of a testicle noticed several times by us, and in which among other organisms the *Bacillus necrophorus* can always be found.

The material or pecuniary loss caused by nodular disease of breeding animals will be very significant for corporations and companies, and considerably greater than for the private owner. The following are the chief disadvantages: temporary exclusion of breeding, partly in consequence of illness and partly from fear of conveying it, great and prejudicial injury to procreativeness, too frequent changes of the bulls, early surrender of many very valuable breeding animals to the butcher, compensation for this by using bulls of little value, depreciating the character of the stock, and disorganization of the cattle-breeding operations.

Concerning the connection between *vaginitis et metritis follicularis infectiosa* and sterility of the cow the following statistics are available:—

Of the 300 cows belonging to seventy-five different owners examined for barrenness 173, or 58 per cent., suffered from more or less well-marked infectious catarrh of the vagina, and 127, or 42 per cent., showed no symptoms of it. Only in eleven of the 173 were acute symptoms shown, such as soiling of the ventral surface of the tail, damp hair at the vulva, swelling of the vulval lips in company

with vaginitis, purulent discharge from the vagina, highly injected or red follicular swellings from a millet-seed to a pin-point in size, plainly prominent and easily felt on the vaginal mucous membrane.

The remaining 162 head suffered from *vaginitis follicularis infectiosa chronica*, which was characterized by small or absent swelling of the vulva, lack of discharge, fading away of the nodes, disappearance of the inflamed area round the nodes, absence of inflammatory symptoms on the mucosa vaginæ, as well as the occurrence of a light yellow colour, which latter is, however, often present in cows far advanced in pregnancy with quite intact vaginal mucous membrane.

From our observations, we believe that there is an intimate connection between the inflammatory appearances of the vaginal mucous membrane, and the activity of the infective virus, and we certainly consider that the latter disappears with the onset of chronicity of *vaginitis follicularis infectiosa.*

Closer examination of the statistics shows that sterility occurred in 173 head in 77 per cent. of cases in three- to six-year-old cows, whilst the three-year-old cows shared 23 per cent. of the sterility cases, and that at the age of 7 to 12 years cases of unfruitfulness were of rare occurrence. Of the 127 remaining cows not suffering from the so-called "not infectious sterility," 69 per cent. were of the age of 3 to 6 years, and the three-year-olds participated in 4 per cent. of these cases. This (*i.e.*, in the three- to six-year-olds) percentage may be explained by assuming that the older animals, being often affected, acquired some degree of immunity, but younger animals with tender, sensitive vaginal mucous membranes possessed no immunity. It is known that ten to twelve-year-old cows, with great, slack, wide vaginæ, as well as younger ones with sinking of the broad pelvic ligaments, nymphomania and prolapsus vaginæ, are very seldom or never found to be infected. Our figures teach us, further, that the cases of sterility in 72 per cent. of the infected cattle and 63 per cent. of the non-infected, were brought for examination in the months of May, June, July, and August, and that the gradual rise in the number of patients only bears little relation to the jumping period (*i.e.*, at certain times of the year). It is certain that the time of the year is only of minor significance, yet, according to the earlier or later, the more intensive or less intensive accomplishment of the covering period in a neighbourhood the number of unfruitful animals diminishes.

The deleterious influence of *vaginitis et metritis follicularis infectiosa* on the specific genital organs has been called attention to in the

report of the Society of Swiss Veterinary Surgeons. Experimental examinations and sections showed that inoculation of the vaginal secretion of cattle affected with acute nodular disease, with *vaginitis follicularis infectiosa*, affected *mucosa vestibuli*, and *mucosa portionis vaginalis uteri*, on to the vaginal mucous membrane of healthy cattle caused a catarrhal purulent colpitis, further that a like colpitis is brought about by inoculation from a pyometra, which has arisen, as we have proved, in consequence of an infected vagina. Catarrh of the uterus, death, and maceration of the fœtus arose. We established, further, both clinically and *post mortem*, that a contagious vaginal catarrh could be set up by inoculation of discharge from a recent badly affected vagina of a cow into the normal vaginal mucous membrane of a young six weeks *post-partum* milk cow, and that by continuity endometritis might easily arise.

In another case, in a two-year-old cow, whose vaginal mucous membrane had been rubbed with fresh matter from a cow badly affected with *vaginitis follicularis post partum* eleven days after inoculation showed contagious vaginal catarrh, and by continuity hyperæmia of the uterine mucosa.

The incubation stage depends on the virulence of the material inoculated. As far as the inoculation of virulent material in our cases proved, it varied from twenty to seventy-two hours.

It is of significance to the breeder, and of interest to the veterinary surgeon, that inoculation of material from the scrotum, prepuce and glans penis of a subject infected in the urethra with chronic nodular disease, but showing no clinical symptoms, did not cause any disease of the vagina inoculated, but material from the mucosa of the pelvic portion of the urethra, from the sigmoid flexure to the neck of the bladder, gave a *positive* inoculation result. These facts, not to be under-valued, agree with observations made in human medicine, whereby it is found that gonococci are most frequently situated, and cause greatest harm in the deeper portions of the urethra, away behind the *pars prostatica*. Sequelæ of nodular disease, according to the Society of Swiss Veterinary Surgeons, are: anaphrodisia, too frequent œstrum, failure of conception in spite of the normal every three weeks' œstrum, abortion in all stages of pregnancy; maceration of the fœtus, pyometra, *retentio placentarum, endometritis catarrhalis et purulenta* (*fluor albus*), ovarian cysts, hypertrophy of the corpus luteum, cartilaginous enlargement of the cervix uteri, with pronounced œstrum and stricture of the cervix uteri during œstrum.

What are the direct consequences of *vaginitis follicularis infectiosa* according to our statistics?

Of the 173 animals brought for examination with acute or chronic nodular disease, ninety-one head showed a disease of the ovaries, representing 57 per cent., and of these forty-one head, or 42 per cent., suffered from cystic and a small number from fibro-cystic degeneration of an ovary, seldom of both ovaries. Of these forty-one head, thirty-six, or 88 per cent., showed nymphomania. Four of these suffered besides from endometritis catarrhalis acuta, and six from endometritis catarrhalis chronica. Five head, in spite of degeneration of the ovaries, showed no erethric nymphomania, but so-called "Stillochsigkeit." The sinking of the broad pelvic ligaments in union with ovarian cysts caused no abnormal genital disturbance (desire for the bull), beyond either only temporary, very insignificant signs or none at all of the appearances of œstrum, on which account such cattle fattened well.

Of the ninety-one cattle with ovarian illness, fifty, or 58 per cent., had one, generally the right, and only exceptionally both ovaries, affected with a hypertrophied *corpus luteum spurium* from the size of a walnut to a hen's egg. This hypertrophied yellow body is to be distinguished from *corpus luteum verum s. gravidisatis*, *corpus luteum spurium s. menstruationis*, *corpus luteum persistens* and *corpus albicans*. Corpus luteum spurium hypertrophicum occurs in cows and cattle affected for some weeks or months with nodular disease, and causes a diminution in œstrum for many months, this being shown by a normal and abnormal heat, the first in non-pregnant cattle being divided into the true and false after rutting, whilst in pregnant cattle an open visible and calm heat occurs. After cure of infectious *vaginitis follicularis* œstrum occurs generally every three weeks, more rarely every nineteen to twenty days, but conception does not ocur, however, in spite of changes with healthy sires. Œstrum is either short, twelve to fifteen hours, or its continuance is normal, lasting fifteen to twenty-four hours, or it may be long, lasting twenty-four to forty-eight hours. It is always, however, too pronounced. Accompanying the abnormal genital disturbance there is often a transitory but plain diminution of appetite and milk secretion, and slight sinking of the broad ligaments of the pelvis. Further, after being served, the animals often exhibit violent straining, and after expiration of the very plain symptoms of heat, a bloody-red slimy discharge, a very unfavourable prognostic of conception ; rectal palpation between the two rutting periods shows an ovary much enlarged, in fourteen- to twenty-day-old cases a hard, elastic, ball-shaped, warty structure, as thick as one's thumb and longer, plainly bounding a false yellow body.

In the remaining eighty-two head affected with *vaginitis follicularis* the following causes of sterility were ascertained: *endometritis purulenta chronica* in consequence of abortion in twenty-four head, or 29 per cent., pyometra in consequence of death and maceration of the fœtus in twenty-one head, or 26 per cent.; *endometritis catarrhalis aut purulenta acuta oder chronica* in sixteen head, or 19 per cent.; acute contagious catarrh of the vagina in eleven head, or 13 per cent.; anaphrodisia in conjunction with chronic nodular disease in six cows, and besides various severe strictures at the introitus vaginæ in ten head, or 12 per cent.

Of the 127 cows affected with sterility *but not* with *an infectious genital disease*, there was disease of the ovaries in ninety-three head, or 73 per cent., and of these seventy-nine, head or 62 per cent., had cystic or cysto-fibrous degeneration. Of these ninety-three animals thirty-seven, or 29 per cent., suffered from nymphomania; with nymphomania and secondary prolapsus vaginæ ten head or 8 per cent.; from nymphomania with secondary endometritis catarrhalis aut purulenta chronica, twenty, or 15 per cent.; from stillochsigkeit, twelve, or 10 per cent.; from anaphrodisia in consequence of persistence of the yellow bodies, fourteen, or 11 per cent. In the thirty-four, or 37 per cent., still remaining sterile, not infected cattle, whose ovaries were normal, the following abnormalities existed: In six head *prolapsus vaginæ* as the result of relaxation, and *endometritis purulenta chronica* in consequence of abortion; in three head, pyometra; in one cow rudimentary uterus and stunted ovaries; in twelve head, decline of œstrum; in the rest, normal genital organs; in six head, anaphrodisia from an unknown cause.

It may be gathered from a comparison of these facts that the number of sterile animals affected with nodular disease is considerably greater that that of non-infected animals, and very often that nodular disease leads to a *corpus luteum spurium s. menstruationis hypertrophicum*. On what irritation this significant growth of the *tunica interna folliculi*, consisting chiefly of increased formation of lutein cells from the cells of the tunica interna folliculi depends, is not yet made plain.

It is, further, a striking fact that since the increased occurrence of contagious vaginal catarrh, not only ovarian illnesses, but also abortion, pyometra, and endometritis cases have experienced a great increase, and that cattle affected with *vaginitis follicularis* uncommonly frequently suffer from chronic diseases of the ovaries and uterus at the same time.

According to our observations, extending over many years, we

found on an average in about 74 per cent. of cases, and more especially in 26 per cent., when the animals were treated with slightly corrosive and irritative injections into the vagina that œstrum was delayed for weeks and even months.

Of the 173 animals affected with sterility and nodular disease, forty-one head, or 24 per cent., were *regularly* in œstrum every twenty-one days; one rutted every twenty-four days; of the remaining 131, seventy-nine head were *irregularly in season;* of these, eight cattle were affected with *corpus luteum spurium hypertrophicum*, thirty-six with nymphomania, twenty-four with endometritis, and eleven with acute *vaginitis follicularis infectiosa.*

Of the first-mentioned head of cattle, œstrum occurred every eighteen to twenty days; in the remaining seventy-one head at intervals of ten days to four months, and in one case only after nine months.

Thirty-six head did not come in season at all during our period of observation; of these five had "stillochsigkeit," twenty-one had pyometra, and ten were affected with chronic nodular disease, and only one came in bulling and was jumped; sixteen head, in which *endometritis purulenta* was established, were noticed by the owner to have a muco-purulent discharge from the vagina.

Interesting was the anatomical fact that in seven of the subjects affected with pyometra, the uterine collection of pus arose in connection with the covering act.

The death of the fœtus in nine to twelve weeks of pregnancy with secondary maceration and formation of a collection of matter in the uterine sac occurs relatively frequently, and is bound up with many disadvantages, which all have one thing in common, that is, that they prevent fruitfulness. We have found twenty head of one breed of cattle affected with pyometra. A result noticed by us in twenty cases was that of deceptive pregnancy from pyometra. When œstrum ceases in one or several jumped cows, the owner believes conception has occurred, but when the animal should be several months advanced in pregnancy is surprised to find that in place of a fœtus, a more or less plentiful supply of pus is present in the uterus. In many cases also a slight opening of the mouth of the womb is connected with a sparse purulent discharge; in other cases the mouth of the womb only opens when the collection of pus has reached many litres in quantity, and the uterine walls become greatly stretched; again in others only during the rutting period in isolated cases quite regularly, and in others irregularly.

In regard to conception, ninety-one out of one-hundred-and-two of the Swiss veterinary surgeons declared that nodular disease was a factor unfavouably influencing fruitfulness, and that indeed this occurred, especially in acute severe cases, whilst in slighter acute, in chronic as well as in cured cases, fruitfulness was influenced little or not at all.

Many veterinary surgeons noticed that if the cattle were acutely infected *ante coitus* no conception occurred, whilst if infection was caused with the covering act fruition took place quite well. Some other collegians, however, state that there are acutely and severely infected steadings where the ability to conceive, pregnancy, or conditions of birth are in no way influenced. On the other hand, it must be acknowledged that in infected standings on many occasions fruitfulness does not occur at all until the complaint has completely disappeared.

It has been known for a long time that acutely infected cattle come on heat three, six, nine or twelve weeks after infection, and indeed, especially if the nodular disease affects the *portio vaginalis uteri*. Many a time the cattle-owner seeks veterinary help if there is a diminution of œstrum, and the professional man called in finds on examination that certain cows have been led to the bull three, six, or ten times; he can then discern in most or all of the head all the different stages of nodular disease together with secondary disease of the genital apparatus.

As already related of the 173 cows affected with *vaginitis follicularis infectiosa* 137 came in œstrum, and thirty-eight did not. Of these 137 head thirteen animals examined had not yet been jumped. There were served: Once, 40 head; twice, 39; thrice, 20; four times, 8; five times, 6; six times, 4; seven times, 4; eight times, 1; ten times, 2. This works out at an average of 2·5 jumps a head, a circumstance which leads to overworking of breeding animals and early impotence.

It was important to know how many of the 173 head examined which were sterile became pregnant again. Through sale, castration, fattening, and slaughter this gap could not be filled up. It is certain that many owners report six months after conclusion of treatment only 40 per cent. pregnant. This significant fact agrees with our observations that after nodular disease power to conceive is greatly reduced, and is most pronounced in those cases where the animals are irrationally treated or not at all, whilst in many places where the illness is fresh without chronic complications, and rightly and rationally treated, the ability to conceive, almost without exception, returns in a few weeks.

Now and again it happens what is worth while for the practitioner to know, *i.e.*, between healing of nodular disease and the occurrence of conception some weeks, and indeed months, may elapse.

Whether retentio placentarum so frequently occurring has any etiological relation to vaginal catarrh is not certain from our statistics. It is certain that this follows in nodular disease, as well as after abortion, and also after normal course of pregnancy, and we could up to now see no difference between the coming or not coming away of the cleansing after infectious abortion, and after accidental abortion through mechanical causes.

CONCLUSIONS.

(1) Sterility of cows stands in intimate relation to infectious illnesses of the genital organs, especially to vaginitis and metritis follicularis infectiosa.

(2) Since the prevalence of infectious catarrh of the vagina and uterus the number of ovarian and uterine affections has quite significantly increased.

(3) The hypertrophy of the corpus luteum spurium peculiar to the cow, and seen in vaginitis et metritis follicularis, is brought about by their stimulant effect on the ovaries.

(4) Statistics taken on infectious catarrh of the vagina, its causes and effects, are to be recommended in the different states.

(5) In connection with the rational examination and treatment of diseases of the female animal genital organs, seeing its great prevalence, and with a view to enhance the value of the veterinary profession, to advance science, and to improve national efficacy, it is desirable that a palpation course of the female genitalia be introduced into the student's curriculum, and made absolutely necessary.

(6) Animal experimental stations are also pressingly necessary, in which clinically and experimentally the influence of infectious genital diseases on fruitfulness may be thrashed out.—G. M.

JOINT EVIL IN FOALS.

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JOINT EVIL is known under different names in the United Kingdom, *e.g.*, navel ill, navel evil, joint ill, omphalitis, omphalo-phlebitis, septic omphalitis, pyæmic arthritis, septic arthritis, &c. The above are good names for the disease, while at the same time they tell us there is something wrong with the joints, and in some instances with the navel. Joint evil, after all, I think the best term.

Definition.—A disease of the sucking foal, due to infection of the

system by certain organisms, causing extensive changes in joints, and sometimes in various organs.

Etiology.—From the researches of Schoule and Ostertag, it is due to infection of navel wound, and then a general infection of the body, and the pyogenic organisms, viz., *Staphylococcus pyogenes aureus* and the *Streptococcus pyogenes*, are responsible.

The above two organisms have been isolated from the lesions of joint evil. "Uffriduzzi cultivated two separate bacteria, a micrococcus and a bacillus, from the bodies of calves which had died of this disease, and successfully inoculated animals therewith, while he observed not only pyæmic, but also septicæmic symptoms, so that it may be presumed that from the infected navel wound both pyæmia and septicæmia may develop. Buch found in the liver micrococci which had a likeness to the diplococci of pleuro-pneumonia. Turner found the same bacteria in the membranes of the ovum of brood mares suffering from epizootic abortion as in the organs of foals that died of 'limping.' Cultures of the same injected into the vagina of pregnant mares produced abortion, with arthritis in the aborted foal."

There is no doubt that the disease is of bacterial origin; the great question, is "What organism or organisms are the cause of it, and how do this or these organisms gain access into the system?"

I am of opinion there is a specific organism which, in all probability, belongs to the facultative group. This organism may in some instances act alone; *e.g.*, lameness, and no suppuration of joints; although certain changes have taken place, along with the pyogenic ones, then suppuration, termed mixed infection. The organism in most cases, at the onset of the disease, gives rise to metastatic lameness resembling at first somewhat that of rheumatism. Might this specific organism be closely allied to that of rheumatism? Then, again, if I may put it so, both these bacteria appear to have a special affinity for articulations, setting up various forms of arthritis.

In the case of joint evil, suppuration is sometimes set up, with its results. The specific organism of joint evil is the primary cause here, while the ordinary suppurative ones, viz., *S. pyogenes aureus* and *S. pyogenes*, &c., are secondary.

We may have a mild case, where lameness moves from one joint to another, no pus being formed, and the attack passing off, may, or may not, leave evidences of its presence, in the shape of bog spavins, thorough-pins, luxation of patella, &c.

We are always told that the bacteria enter at the navel, and what more natural than to blame this site, which, just after birth, is a very

open wound. In my humble opinion, too much stress has been placed upon this site, and other sites neglected, as the means of access. In some cases the umbilicus is shrivelled up in a perfectly healthy and normal co dition, and yet we have a case of joint evil, although we know the organisms could have entered prior to healing of umbilical wound. If this was always the channel of entrance we should expect the umbilicus to be in almost every case abnormal, but this is not so. Far from it. Then, again, we have some foals, with a pervious urachus (which is sometimes difficult to close), even in a suppurative condition, which never take the disease, although I must confess some of them do. A pervious urachus used to be looked upon by some as the first symptom of joint evil. If the point of entrance was always the navel the umbilicus would be oftener affected than it is. I do not deny that bacteria do not enter at the navel in some cases.

We must now turn our attention to some other means of entrance. Do organisms enter *per os?*

In the first instance are they gathered from the litter into dam's mammary gland, and thence sucked by foal along with the milk; and thus offspring may become infected that way?

Then, again, does the foal become affected *in utero*, or more possibly is it affected in "the passage" during delivery?

Some mares have diseased foals year after year, which fact has led some breeders to declare it to be hereditary. I do not go so far, but I think there is a great predisposition on the mare's part; neither do I hold the sire blameless.

These organisms, when once gaining the system, travel by the blood or lymph stream, more probably the former, until they arrive at their favourite site, viz., articulations, although I have seen abscesses in the intercostal space. If it were the ordinary suppurative organisms, I think the lymphatic glands throughout the body would be oftener affected than they are. We would expect the glands to be affected before articulation, but this is not the case.

The period of incubation is twenty-four hours to twenty-one days; may be up to forty-two days.

I delivered shire mare of colt foal, ligatured umbilical cord with antiseptic silk, and dressed parts with corrosive sublimate solution, 1 to 500; foal took joint evil on the third day, died on the tenth; stifle and both hocks affected, umbilical wounds normal. Am confident foal was contaminated during delivery, or infection was sucked along with the milk.

Another case was in a nag foal; the umbilical cord was ligatured

with silk, dressed with corrosive sublimate solution, 1 to 500; in fifteen hours foal drowsy: dead lame in near elbow; died before it was thirty-six hours old. *Post mortem*, widespread gelatinous exudate surrounding elbow-joint, umbilical vein filled with coagulated blood. In this case I should say infection occurred before birth.

The following are given as predisposing causes, some of which may have lowering influences: "Cold, wet, damp weather, by lowering vitality, ligaturing cord too far from abdomen, dirty ligature, ligature too thick, dirty hands of operator, ligature too loosely applied, dirty foaling box, box previously occupied by joint evil patient, metritis cases, strangles patient, raw condition of umbilicus owing to cord breaking off too near body, dirty navel by contact with mare's vagina, or litter, may be affected *in utero* because joint-evil and abortion often occur together."

According to the late Dr. G. Fleming, the following are given as predisposing causes:—admission of air or foreign matters to the interior of umbilical vessels, bruises or injury to the umbilicus either during birth or afterwards, irritation of the part either by the litter, manure or urine, the habit which certain females have of licking the umbilicus of their progeny, or of young creatures to suck the remains of the umbilical cord of each other, rupture of the cord close to or within the abdomen, improper aid given to mother, exposure to cold or wet.

Symptoms.—In very young foals up to about three days, the first thing noticed, before even lameness, are dulness, no life, hurried breathing, sweats, temperature 104° to 106° F., hard, accelerated pulse, mouth hot and dry. In a very few hours the patient falls lame in one or more joints, and gradually merges into a case of joint evil. Foals older than about three days, left apparently well at night, next morning may be noticed to be lame in a limb. In some instances owner imagines foal has been trodden upon by mother. Perhaps before many hours lameness has left that limb and appears in another, the lameness at this stage resembling somewhat that of rheumatism in being metastatic. Joint slightly swollen, hot and painful, foot elevated from ground usually, temperature 103° to 106° F., pulse quick and hard, respirations hurried, mouth hot and dry, bowels constipated, foal stiff when moved about, but still sucks. At this stage it is wise to examine umbilical region. We may have an open urachus—patent urachus—but this is not always the case. When the foal urinates, instead of urine passing by urethra, the natural course, a few drops, or even a stream, may pass by urachus. This occurs both in male and female. The urachus

is a fœtal structure, which should lose its function after birth as a channel, and become one of the ligaments of the bladder.

We may have cases of patent urachus, even to a suppurative condition of umbilical region, which never develop into joint evil. Joints most commonly affected are stifle, hock, elbow, shoulder, hip, knee, and fetlock; latter two not often.

As the case proceeds, lameness increases, often settles in a particular articulation, and becomes a severe case, very painful, more swollen, and begins "to point" in the course of time. There is more chance of a recovery when it settles in a joint, and stays there. In a mild case, joint swollen, painful and hot but no suppuration, if in hock terminates in bog spavins and thorough-pins; in stifle, terminates in luxation of patella "stifled." In a chronic case, temperature, pulse and respiration remain elevated, hair easily pulled from mane and tail, animal lays a great deal, great difficulty in getting up to suck, bedsores, suppuration at various articulations, sunken eye, greatly emaciated. Resolves itself into a case of pyæmia, or empyæma, goes from bad to worse, until it becomes a pitiable object, and either is destroyed or dies from exhaustion. Mortality, 50 to 80 per cent.

Prevention.—First of all attend carefully to foaling box. Clean all old litter out, and swill floor with hot water, to which has been added Jeyes' fluid, or any solution of that series, or a solution of copper sulphate. Boxes in the country are not usually paved; sprinkle floor with solution of Jeyes' fluid or chloride of lime. If case of joint evil, strangles, or metritis, has been in previously, do not use it that season, rather let it stand idle, and clean out ready for next season. Place clean straw on floor, and sprinkle this with some solution like the previous.

If the weather is fine, mares are better foaled outside, in a grass field. If umbilical cord (which consists of urachus, two arteries, one vein, and Wharton's jelly) breaks, which it invariably does at the weakest part, paint raw stump with solution of corrosive sublimate, 1 to 500, every day for three or four days, or pure carbolic acid may be used, or paint with corrosive sublimate solution. Then on top of this paint with a mixture of collodion 7, salicylic acid 1. If the umbilical cord has not broken, ligature with piece of antiseptic silk, about ½ in. from abdomen, tying ligature as tight as possible. The operator having previously washed his hands in some water containing any disinfectant (these things are not always within reach at the majority of cases), cut cord off about ½ to ¾ in. below ligature, at same time paint cord and stump with 1 per cent. solution of corrosive sublimate, also with a mixture of

collodion and salicylic acid; or leave out collodion mixture and paint stump daily with corrosive sublimate solution for three or four days at least. Some veterinary surgeons use carbolic acid, 1 to 20. I hardly think this is strong enough, as it keeps cord very "moist," whereas corrosive sublimate "shrivels" it up like parchment, and keeps it in a dry and leathery condition. Should we have any signs of a "moist umbilicus," clean region first with warm water containing any antiseptic, paint all around umbilical region with corrosive sublimate solution, then dust in oxide of zinc and copper sulphate, equal parts, daily for a few days. If weather is good, get mare and foal out to grass as early as possible, if only for a few hours daily. Do not turn mare and foal out along with another foal that is affected with joint evil, or even with a strangles patient.

Some umbilical cords are tied too low down and not tight enough, and some ligatures are too thick. Wash mare's mammary gland, thighs, hips, vulva, tail, &c., with a 5 per cent. solution of boracic acid, or a 5 per cent. solution of thymol, commencing a few days before she is expected to foal. Wash mammary gland before foal is allowed to suck, also for a few days after foaling with same solution, especially if mare has bred joint evil foals previously. This should be religiously carried out. There is not enough care bestowed upon these parts, and too much on navel. Give mare regular exercise before foaling.

Treatment.—If first symptom is an open urachus we must attend to that first. Cast patient on left side; wash umbilical region in warm water containing either Jeyes' fluid, lysol, chinosol, &c., &c., at the same time removing all *débris*. After this, some veterinary surgeons apply one of the following: lunar caustic, actual cautery, cantharides, blister, corrosive sublimate solution, 1 to 500 or 1 to 1,000—the latter I do not think strong enough—pure carbolic acid, or 1 to 20 in glycerine, or olive oil, salicylic acid 1 part, and collodion 7 parts, sulphate of copper and zinc oxide, equal parts.

The idea in most instances is to set up inflammation, with all its sequelæ, cause swelling, and thus close the orifice, converting the urachus into a fibrous cord. Have seen some odd ones, that no kind of treatment closed up, they ran in spite of everything, and only ceased to run when they were turned out to grass, and they never had joint evil, the "cure," I think, was due to change of environment.

Some veterinary surgeons place two large pins through remains of cord close to body, at right angles to each other, and above pins wind around antiseptic silk, firm, but not too tight; but in some instances this sloughs away in the course of a few days without accomplishing

its object. As soon as foal goes lame, if it is not in good surroundings, place it in such. If foal is unable to get up, have it lifted up frequently; do not let it stay down too long. By this means it sucks more frequently, does not get stiff; no bedsore, empties bladder and rectum.

Should weather be anything like fine, get them out to grass, if only for a few hours in middle of day; if storms come on, then they must be brought in. If bowels are constipated, give enematas of glycerine. I think this better than giving castor oil *per os;* if you give the latter, warm the oil first. As regards drugs, we all know the very young do not stand much. The following have been all tried and much vaunted: Quinine sulphate, Easton's syrup, salicylic acid, salicylate of soda, hypo-sulphate of soda, cod-liver oil, lime-water, iodide of potassium, binioide of mercury. Many assert there is nothing to beat 1 gr. of the latter, given night and morning.

With the joints rub in camphorated oil, belladonna liniment, arnica and aqua saponis, and a solution of iodine: each person has a preference for one or another of above. If they do not look like responding, foment with warm water, rub as dry as possible, and then apply one of the above dressings. If joint looks like suppurating, apply a mild biniodide blister to the part; poultices are worse than useless. When abscess "points," rather allow it to burst than open it; pus is turbid in appearance, has a peculiar fœtid and characteristic odour, and sometimes contains flakes of lymph-like material. Syringe cavity out with warm water containing chinosol, lysol, &c., twice daily, at the same time keeping surrounding area clean.

"At the commencement of the malady foals two to three weeks old have received 10 c.c. daily of antistreptococcus serum to 5 c.c. or less, as soon as resolution is established, continued throughout illness; 5 c.c. to 10 c.c. given as prophylactic on eighth and fifteenth days."

I have given a hypodermic injection of ½ c.c. liquid antistreptococcus serum polyvalent daily at the commencement of the attack. Candidly I must confess it acted like the other so-called specific; some recovered, whilst others died. My experience with the serum has been like that with the drugs, nothing to boast about.

I cannot see what great effect the serum can have in the disease until the definite organism of the disease has been isolated, but with a disease like this we are glad to give anything a trial. It is really surprising how some cases will stagger in and improve with very nearly any sort of treatment, whilst others will succumb after no end of careful attention and the best of hygienic surroundings. I really think recoveries are oftener in the common-bred animals than

in the well-bred ones. Sex has nothing to do with it. It is of little use commencing treatment if abscesses have already formed.

Post Mortem.—This greatly depends on how far the disease has progressed. If in an advanced state, great emaciation, remains of abscesses, pus found in region of various joints. Umbilical region may be normal or abnormal; if the latter, slightly enlarged, matted with pus, and scalded in region of thighs with urine. Upon removing skin over affected parts, a variable quantity of gelatinous material is seen, or purulent pus in suppurative arthritis. The pus varies a great deal in amount, has a peculiar appearance and characteristic odour which is difficult to describe; it also contains flakes that resemble flakes of coagulated lymph. Upon disarticulating the joints, capsular ligament inflamed and easily ruptured. Pus may or may not be present within the articulation. Synovia invariably increased in quantity, turbid in appearance; flakes may be present; synovial fringes enlarged and inflamed. Articular cartilage reddened, may be eroded, and easily pared with a knife; granulations commencing to form in small islands in cartilage. Tendons and ligaments in affected region inflamed, easily torn from their attachments and macerated. Abscesses in internal organs varying in size from a pea upwards, chiefly in liver, kidneys, spleen, and lungs. Umbilical vein in its course to liver may consist of a chain of abscesses, or more often a jelly-like material. Abscesses in umbilical vein are not as often found as some veterinary surgeons imagine, and when found, I am of opinion umbilical vein was not affected primarily, but secondarily. In many instances I have found vein normal. It resolves itself into a case of pyæmia and empyæma.

This is a disease largely met with in an agricultural, and especially a horse-breeding, district, and to a certain extent the bane of the horsebreeder of this country. I cannot call to mind seeing a case of joint evil in the Western States of the United States of America, where hundreds are foaled out in the open air, practically in a semi-wild condition, and never under cover. After paying service fees, keeping dam waiting practically twelve months, we get an offspring which is carried off by this disease, or practically rendered useless. At the same time, it is a very unsatisfactory disease for the veterinary surgeon to treat. If the animal recovers from the disease, in a number of cases it is little better than a "screw"-bog spavins, thorough-pins, enlarged hocks, enlarged stifles, luxation of patella, enlarged fetlocks. I almost think it comes next to contagious abortion in importance as far as a breeder is concerned, and yet very little attention is paid to it.

Clinical Articles.

SOME SURGICAL CASES

By D. DEY, G.B.V.C.

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I READ a statement recently in one of the veterinary periodicals that the British practitioner's opportunities of performing surgical operations is somewhat limited, and that owing to cost of treatment the animals are very often slaughtered. In Bengal, operative surgery is a subject in which we are compelled to be experts, because a very large number of our clients will not allow their animals to be killed, for religious reasons ; and, while they do not object very much to expense of treatment, they would turn their animals out to die sooner than have them killed. It necessarily follows that we undertake constantly operations which an English practitioner is very rarely called upon to perform. To show how different our practice is from yours, I have taken Colonel Raymond's permission to send to you a short summary of a few ordinary cases which I presume would have been killed in England and probably used for food.

I.—A Fibro-lipoma on the Forearm of a Cow.

The patient, a well-bred Montgomery cow, about six years old, was admitted with a tumour on the left forearm from which a quantity of serous fluid constantly dripped through a big sinus. The neoplasm was first noticed two years previously as a very small wart-like growth; its size at the time of admission is depicted in Fig. 1. This cow, which had been formerly a very strong animal and a good milker, was extremely emaciated in consequence of the bother and pain caused by the growth.

Having obtained the owner's permission with some trouble, it was decided that an operation should be performed at once; therefore under full anæsthesia and antiseptic precautions, tourniquets were applied, and the whole of the tumour, which was lying between the flexors and extensors of the knee and foot, was dissected away through an elliptical incision made for the purpose; the hæmorrhage was slight and easily controlled. The wound was closed and a boric compress was applied.

Next morning the animal was off her feed, and the temperature had risen to 104° F. A febrifuge with aconite was prescribed. On the sixth day after operation, the temperature, which had remained

FIG. 1.

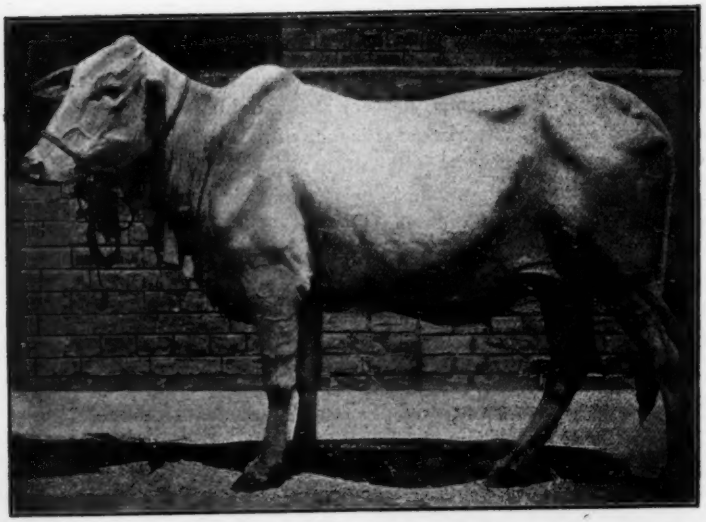

FIG. 2.

high, became normal, the animal took her usual diet and appeared bright. The wound healed by first intention.

Fig. 2 shows the animal at the time of her discharge from the infirmary. It will be noticed that her appearance has quite changed, and she would not be recognized but for the suture marks which are present on the left forearm. She was very brindled and thin when admitted, and she went out greyish-white in colour and fat. The tumour, which weighed 9½ lb., was found to be a fibro-lipoma.

II.—Mammary Abscess in a Cow.

A cow, with a large mammary tumour, very hard and tense, was brought to the infirmary for treatment as an out-patient. The owner,

Fig. 3.

who had been treating the animal himself, said the swelling commenced about a month previously and went on increasing in size despite all his domestic medicines. The cow was a fairly heavy milker, but had wasted away and looked emaciated.

The tumour was found to consist of an abscess affecting the two quarters of the right side. After the animal had been photographed, the legs and area of operation were shaved and washed thoroughly.

The whole of the affected quarters were carefully dissected out. The wound was thoroughly cleaned out and disinfected and sutured; boric compresses applied with suspensory bandages.

The following morning the temperature was 104·4° F. and continued high for four days, after which it remained normal. The wound in the meantime was washed out with creolin solution and dusted with boric acid daily. Owing to the profuse discharge the treatment was changed on the sixth day for a lotion of sulphate of zinc used with a syringe, but the outer wound was dusted with boric acid.

After the tenth day the discharge became much less and the animal began to pick up. The wound progressed satisfactorily and the patient left the hospital two and a half months after admission with two sound quarters. Fig. 3 represents the animal before operation.

The tumour weighed 16½ lb.; on section it was found to contain a mass of cheesy inspissated pus and the gangrenous remains of the gland which was made up into a ball. Microscopic examination of the pus revealed cocci of various forms.

III.—Amputations.

We perform amputations on all manner of animals from horses to birds; the following two are ordinary samples.

(1) *Amputation of a Ram's Leg.*—A pet Chinese ram of the fat-tail sort was admitted on the morning of November 9, 1908, with a compound comminuted fracture of the right hind leg at the proximal extremity of the tibia, having been run over by a railway carriage. There was a lacerated wound on the upper third of the thigh leading to the fractured tibia, the lower fragment of which was protruding; there was much comminution of the bone and laceration of the soft parts. Below the lesion the limb was discoloured, cold, and pulseless, but there was no line of demarcation separating the dead from the live portion. The animal was suffering badly from shock.

A stimulant was given and strychnine injected hypodermically; from the hip down to the fracture, the limb was shaved, thoroughly washed with soap and warm water, then with equal parts of ether and alcohol, and then thoroughly disinfected with perchloride of mercury lotion. On account of the low condition of the patient, A.C.E. mixture was used as anæsthetic instead of chloroform. The limb was made bloodless and tourniquet applied. Two equal flaps, anterior and posterior, were made, the lower end of the flaps being well above the wound so as to avoid including any unsound portion. The soft tissues were cut through and the bone sawn above the base of the

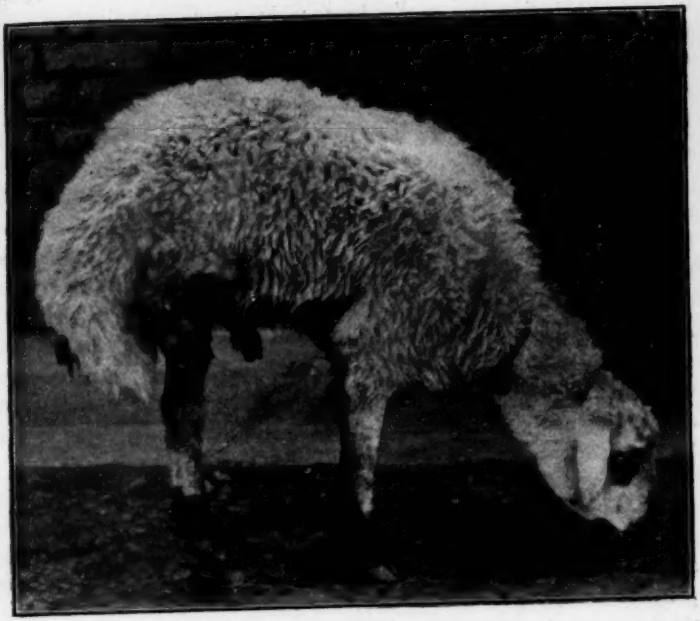

FIG. 4.

FIG. 5.

flaps, the principal vessels were ligatured with catgut before removal of the tourniquet, a few smaller twigs which were found bleeding being secured afterwards. Hæmorrhage having stopped completely, the wound was closed with interrupted sutures. The temperature, which was high on admission, came down and became normal on the fifth day; the wound healed by first intention; the sutures removed on the tenth day. Fig. 4 represents the case after recovery.

(2) *Amputation of a Deer's Leg.*—The animal, a young deer, was admitted in a semi-conscious state, with a compound comminuted fracture of the right hind leg at the middle third of the metatarsus, caused by a fall from the terrace of a house. The limb was so badly damaged that conservative treatment was out of the question. The animal was anæsthetised and the limb was amputated with all the precautions mentioned in the former case, the circular method being adopted, as it was found in this position to be more convenient. The animal made a good recovery and left the hospital in three weeks. Fig. 5 represents the animal after recovery.

IV.—Laparo-hysterotomy in a Cow.

We do a very fair number of Cæsarean sections in ruminants, canines, and felines. Unfortunately many of our larger obstetrical patients are brought in such an exhausted state, and the uterus and the fœtus are in such a mutilated and septic condition, that surgical intervention is practically hopeless.

The patient, in the case under report, a well-nourished primi para cow, was admitted with urgent symptoms of dystokia. On examination *per vaginam* the fœtus was found alive occupying the right horn of the uterus and presenting the sternum and the abdomen. As it was impossible to extract it whole, owing to its size, and as the mother was in good condition, the uterus not having been apparently injured by repeated examinations and unsuccessful attempts at delivery, it was decided to perform Cæsarean section.

The animal was anæsthetised with chloroform, and prepared in the following manner, with the additional precaution of cleansing and disinfecting the vagina. The triangular space covered by the transverse processes of the lumbar vertebræ, the posterior border of the last rib and the anterior spinous process of the ileum on the right side, was thoroughly shaved, washed with soap and warm water, scrubbed with equal parts of ether and alcohol, and disinfected with alcoholic solution of mercuric chloride. Having prepared the operation field, a longitudinal incision of 12 in. was made in a direction downwards and

forwards so as to correspond with the fibres of the oblique muscles; the subcutis, external and internal oblique and transverse muscles of the abdomen were quickly incised. The wound was kept open by two retractors held by assistants and the hæmorrhage controlled by compression, then dividing the parietal peritoneum the abdomen was reached. The right hand, wet with warm boric solution, was introduced in the cavity and the uterus was brought opposite the incision, care being taken to avoid injuring the intestines. Two assistants with clean and antisepticised hands pressed the sides of the wound against the uterus; then the visceral peritoneum and the longitudinal and circular muscular fibres of the uterus were divided. The fœtus was found alive enveloped by its membranes within the uterus; these membranes were carefully punctured with an aseptic trochar and cannula, and the contents were allowed to escape outside the abdomen; a slit was made through the membranes and enlarged, and the live fœtus was brought out through the abdominal wound.

Having delivered the fœtus, the umbilical cord was clamped in two places, between which it was divided, and subsequently a ligature with sterilized catgut was applied to the stump. Then the fœtal membranes with the placenta were removed through the wound after detaching the fatal cotyledons from the maternal ones. A few minor twigs of the uterine wall were pressed by compression forceps. The cavity of the uterus was then thoroughly cleaned with a sterile sponge wetted with warm sodium chloride solution. The uterine wall was sutured with sterilized catgut with the edges of the wound being inverted so as to bring the peritoneal surfaces in contact. Next the abdominal cavity was cleaned with warm salt solution, and the muscles were stitched with sterilized catgut; a drainage tube was inserted between the skin and external oblique muscle, and the skin was closed by interrupted sutures of silkworm gut. This part was thoroughly wiped with a biniodide of mercury solution and subsequently dried with dry aseptic sponges and gauze; iodised collodium was applied over the stitches, and iodoform gauze was applied under a generous boric padding and bandaged with firm pressure. The animal suffered from shock and the temperature was high next morning, but a febrifuge was given, and the strength of the patient was supported with nutritive gruels. The milk secretion was drawn off regularly. On the tenth day the animal regained her appetite and commenced to graze; the bandage was then dispensed with and the wound was covered with collodium and iodoform. Most of the sutures held and were removed on the twenty-first day. There was practically no

vaginal discharge during the course of treatment. The animal left the hospital within a month, making a complete recovery. The calf only lived for three days.

In concluding, I may say that in a climate like that of Calcutta, surgery with our patients presents difficulties which are not found in the same degree in some other places, but local experience teaches us how to combat these troubles to a large extent. For instance, it used to be considered that a castration case could not do well in the rainy season, but we find that we are quite as successful then as at any other time. Our chief annoyances are due to insect carriers.

A PECULIAR MONSTROSITY IN A HEIFER.

By AINSWORTH WILSON, F.R.C.V.S.,
Witham, Essex.

The subject of this note was a full-time shorthorn heifer, in capital condition, one of a large batch which I had subjected to the tuberculin test three weeks previously.

On my arrival at the farm I found that she had been in labour some hours, the pains were normal, and her strength well sustained. On examination I found one foot, a hind one, presented at the vulva; two others, a hind and a fore foot, lay in the anterior portion of the vagina; the cervix was almost filled up by the protruding hind limb, barely admitting the hand into the uterus.

A rope was slipped over each fetlock, and an unsuccessful attempt was made to push back the hind limbs, and by traction on the fore limb to reach the head. Alternative attempts to repel the fore limb and to bring the hind ones into position revealed a remarkable state of affairs. Each time traction was exerted, the three limbs, together with the tail, advanced simultaneously, in spite of efforts to the contrary.

I was led to suspect the presence of twins, or a possible mistake in the identity of the limbs—at this stage the existence of a twisted fœtus did not occur to me. After some time it became possible to push back the protruding hind limb some 12 or 18 in., enabling the hand and arm to enter the uterus; the nose came just within reach, and a little traction on the fore limb allowed the slipping of a noose on the lower jaw; later on a blunt hook was inserted in the eye-socket. Then two or three ribs, denuded of skin, could be touched with the tips of the fingers.

Delivery of the fœtus *in toto* being impracticable, embryotomy was resorted to. The protruding hind limb was removed subcutaneously,

not without great difficulty, inasmuch as the hock could not be advanced further than the vulva. A ventral transverse presentation was now discovered to exist, the fœtus lying jammed across the uterus, the limbs, tail, and head all close together in a heap, as it were. Neither the remaining hind limb nor the head and fore limb could be brought into the passage, while it was evident that some growth or covering enveloped them close to the trunk; the nature of this envelope was not apparent at the time.

At this stage I informed the owner, a gentleman farmer, who was rendering every assistance, that we had apparently a twisted monster to deal with, and that its delivery or further reduction in size was beyond my powers—this after ineffectual efforts to bring the mass within operative reach and to slit up the sheath or covering. Permis-

Monstrosity (Mr. A. Wilson's case).

sion being obtained, I thereupon killed the heifer. After she had bled properly, an incision was made along the median line and carried downwards to the pelvic symphysis; the saw for the bone, and the knife for the vagina and uterus, soon exposed the exact position and the abnormal characteristics of the calf. The latter are shown more or less clearly in the two photographs (for the photographs the amputated limb was replaced in position). They may be summarized as follows; Ventral transverse presentation; double spinal curvature, like the figure S; the four legs, head, and tail close together, and over them is reflected a large pouch of skin, the hair forming the inner lining of the pouch; the humerus of the hidden fore-leg is situated

anteriorly; the fœtal body cavity is absent, the ribs of each side being closely applied along their entire length. The specimen resembles the *Schistocormus reflexus*, illustrated in De Bruin's "Obstetrics," and reproduced in other works. It is, no doubt, a form of schistosoma; but it must be observed that here one fore-leg is dwarfed and completely hidden at the bottom of the pouch; it completely encircles the neck just behind the ears. Lastly, the viscera are seen lying free at the posterior border of the trunk, to which they are attached.

Remarks.—This case is yet another example of curious abnormality in fœtal development. It illustrates one of the difficulties, fortunately of rare occurrence, with which veterinary obstetricians have to contend, besides, perhaps, possessing a certain educational value. For these reasons I am induced to record it.

Monstrosity (Mr. A. Wilson's case).

In any form of twisted spine, with little room in which to work, it is by no means easy to dispel the suspicion of twins from one's mind. Serious dystokia is present, and the condition for a time is very puzzling. Once the existence of a single fœtus is established, the familiar text-book formula, "Reduce the size by embryotomy," is often inapplicable, and one has, perforce, to accept the inevitable.

It may be of interest to state that the monster was perfectly fresh; death had apparently occurred some four or five hours prior to operation.

Professor W. L. Williams ("Obstetrics," 1909) remarks that in his cases putrefaction and emphysema of the fœtus preceded the symptoms of dystokia.

SOME NOTES FROM PRACTICE.

By G. MAYALL, M.R.C.V.S.,
Norwich.

I. Eversion of Rectum in a Sow.

I was called to a sow, aged 2 months, that had everted her rectum, on December 10, and found 4 in. of the organ out. I sutured the rectum with five silk sutures close to the anus, cut off the protruded portion of gut with knife and scissors, and returned the stump well into the passage. I then ordered the sow to be fed on skim milk and bran, and separated from her companions for a time, and kept warm and dry. She has done well.

II. A Curious Sequel to Strangles.

A chestnut cart-horse, after recovering apparently from an attack of strangles, held his head on one side and showed great pain over the region of the right eye. From the back of the eye a purulent discharge escaped very quickly when the eyeball was moved from the inner canthus. There was no swelling about the forehead or near the eye; but the horse flinched and shook his head on pressure in this region. Mag. sulph. was given in the drinking water, and the eye and its neighbourhood bathed with warm, weak solution of mercuric iodide, and afterwards lead lotion. In a fortnight pain was gone, and discharge too; and the horse, after three months from the first attack of strangles, is at work. I am quite unable to say what the state of things was here, or what caused the pain and discharge, unless it was pressure of pus on the optic nerve and lodgment of some catarrhal discharge at the back of the eye.

III. Pneumonia after Fistulous Withers.

Attended a case of fistulous withers in a hunter, which appeared to be lymphomatous. He was an old horse. Gave iodide of potassium internally, and externally massaged the swelling with pot. iodide with liquid soap, and applied warm fomentations. In a fortnight the swelling had greatly increased, and was opened, giving exit to a lot of flocculent material and dirty-coloured serum. The cavity was well injected with tincture of iodine, and a plug soaked in the same inserted afterwards syringed out with zinc chloride. Iodide of potassium was still given internally. The animal was going on well when, as he was not of much value, and in order to make room for another sound knight of the chase, and contrary to order, he was shifted into a bullock yard, where some fresh manure had been turned over. Two days here brought on septic pneumo-pleurisy as a complication, and he was ordered to be destroyed.

Canine Clinical Notes.

A FEW NOTES FROM PRACTICE.

By G. MAYALL, M.R.C.V.S.

Norwich.

I.—Luxation of the Eyeball.

A pug-dog brought in on October 3, 1909, had the eyeball out of its socket about an inch. He had been fighting with another dog, and thus got it displaced. The globe was not wounded in any way. After cleansing with lukewarm solution of hydrogen peroxide the eyeball was put back, but it did not remain in its place easily, and before this could be accomplished the eyelids had to be kept closed over it for about ten minutes, and then cold water trickled over the outside of the eye. I was doubtful whether the eye would remain in its place during the night, but was pleased to find in the morning that it had not been everted again, but as a precaution told the owner, who wanted the eye saved if possible, that it might have to be removed.

Although on the morrow the member was in its place, the sclerotic on the inside of the eyeball was tumefied, prominent, and injected. I applied a fairly strong solution of protargol to it with a brush, and this condition gradually improved. The dog was discharged at the end of a week, and the owner a fortnight later said that the eye was normal in appearance, and that the animal was able to see with it. I treated the pug within about an hour of the accident, so was favoured in that way.

II.—Extensive Accidental Wounds.

A sheep-dog was brought to me on September 28, having got into the reaper, and both fleshy parts of the forelegs about 4 in. below the end of the humerus and at the front of the radius were cut to the bone. The wounds were incised ones. The paw and carpus of the left fore leg were bent back, and the dog could put no weight on the limb.

I clipped the hair off in proximity to the wounds, cleansed the skin and cuts with antiseptic, sutured the muscles and skin with iodoform tape sutures, these being only in one row, and going right through the extensors and skin. Six were put in one leg and four in the other, and in addition an extensive skin wound in the flank was sewn up.

The dog was kept in the infirmary six days, at the end of which time the owner took him home. He recovered, and is now doing well. Had he not been a great favourite with the owner, a farmer, he would have been destroyed rather than treated.

III.—Recurrent Eversion of the Uterus.

A bull bitch everted her womb for the third time this morning, January 2, 1910. It was out 2 in. further than on previous occasions when I have returned it. After cleansing the organ with a cold solution of mercuric iodide, and working at it five minutes, I managed to return it. The eversion of the uterus seems to occur periodically at the time of coming in œstrum, but it could not certainly be said that this was the case on this occasion. She is an old bitch, and has put out her womb on three occasions during the last eighteen months. This time the organ outside the vulva was as big as one's fist in size, tumefied and congested.

Miscellaneous.

UNIVERSITY OF MELBOURNE.

We are very pleased to announce that Mr. S. S. Cameron has qualified for the degree of Bachelor and Doctor of Veterinary Science of the above University. It is interesting to note that this is the first degree of Doctor of Veterinary Science issued by a British University, although such degrees have been issued by Continental and American Universities for some time past. The theses for which Dr. Cameron was awarded his degree included contributions upon hereditary unsoundness in horses, pleuro-pneumonia contagiosa of bovines, epizootic amblyopia in horses, and tuberculosis in animals and man. The examiners were Professor Allan, Dr. J. W. Barrett and Dr. Cherry.

Samuel Sherwin Cameron qualified as a Member of the Royal College of Veterinary Surgeons in May, 1888, having taken out his course at the New Veterinary College, Edinburgh. He is now Chief Veterinary Officer of the Department of Agriculture, Melbourne.

FOOD CONGRESS AT PARIS, 1909.

In connection with the Congress which was held in Paris in October last, a beautiful medal, from the design of Daniel Dupuis, has been presented by the White Cross Society of Geneva to Mr. Loudon M. Douglas, of Edinburgh, who acted as Honorary Secretary to the English-speaking Section of the Congress.

Abstracts and Reports.

TICKS AND TICK-BORNE DISEASES.

By Dr. A. THEILER, C.M.G.

Government Veterinary Bacteriologist, Transvaal.

The diseases which are tick-transmitted in South Africa may be classified into two groups. One, in which the immune animal retains the infection in the blood, in other words, in which the recovered animal acts as a constant reservoir for the virus; and the second group where the blood of a recovered animal becomes sterile and therefore harmless. The former fact explains the reason of the constant infection of African veld by red water, biliary fever, and gall-sickness. The animal which recovers from the disease acts as a host for the ticks. The ticks become infected with the parasites, and in turn carry them back again to the animal. In this way a circle is formed between the animal, the cause of the disease, and the tick. The tick and micro-organism of the disease are dependent on the animal; without the animal their life-cycle would finish. They require the animals for the multiplication of the species, and accidentally, through the invasion of a great number of parasites, such an animal becomes sick and may die.

An adaptation between the animal and the micro-organisms results, by which both benefit, the animal with its immunity and the parasite with a permanent home. It can be deducted from these facts that the disease would have to disappear if we were able to break the circle by removing either micro-organism or tick, as the life-cycle would naturally come to a standstill. It must be reasonably expected that the easiest thing to attack is the tick, but to attack it successfully its life-history must be properly explained.

The Life-history of the Tick.—The ticks belonging to the order of *Acarinæ* are easily recognized by the naked eye as flat bodies when not engorged, or more or less swollen when engorged with blood. We distinguish male and female in the adults, and male always remain flat, whereas the female engorges and grows in size; in this country the latter is usually known as the tick proper. Male and female meet on an animal, and after feeding they seek each other for copulation, and as soon as the fertilization has taken place the female engorges. Underneath this engorged female the male can usually be found. Before repletion the female is about the same size as the male. The presence of the small tick underneath the female, especially in the case of the blue tick, has led to the popular opinion that this is a young one. After the female has repleted herself she hides in the grass or in the sand. Soon after hiding away in this manner she begins to lay her eggs. This process of oviposition varies in length of time according to the season in which the ticks drop. After a lapse of a certain period the eggs begin to hatch, and the young larvæ appear; they are commonly known as seed ticks, and they seek their way to the top of the grass or bushes, from which they attach themselves to a suitable host which may be passing. So far the ticks with which we have to deal behave similarly, but the various species differ in their habits, and according to these habits we can divide them into three groups:—

(1) The ticks which, for the completion of their life-cycle, require only one host. To this group belongs the blue tick. It reaches the host as a larva; it moults (changes its skin) on the animal from the larval into the nymphal stage, and again from the nymphal stage to the adult stage. In the adult stage the sexes meet again, and the life-cycle begins afresh.

(2) Ticks which require two hosts for the completion of their life-cycle. To this group belongs the red-legged tick. It comes as a larva, it moults into the nymphal stage, and leaves the animal as an engorged nympha. The moulting process takes place in the ground from the nymphal to the adult stage, and the sexes meet again on the host.

(3) Ticks which require three hosts for the completion of their life-cycle. To this group belongs the family of the brown ticks, the black-pitted ticks, and the bont ticks. The larva reaches the animal and engorges, and, as soon as it has done so, drops to the ground, where it moults (after a lapse of a certain time) into the nymphal stage. The nymphæ seek a second host, also engorge, and, after repletion, drop to moult into the adult on the ground. The sexes seek a third host, where they meet, and the whole life-cycle begins again.

Of interest to us from our point of view are the dates required

(1) For laying the eggs.
(2) For the hatching into larvæ.
(3) For the completion of the life-cycle on the host in the case of the one-host animal, the blue tick.
(4) The time the larvæ and nymphæ require to replete on a host.
(5) The length of time the engorged larvæ and nymphæ on ground require to moult.
(6) The length of time the adult females remain on the host before they drop.
(7) The length of time these various ticks and stages of ticks may live.

Concerning these the following facts are known :—

Blue Tick.—The whole length of time this tick requires from larval to adult stage averages three weeks. From the third week the engorged blue females begin to drop, and about the end of the fourth week they have all left the host. In other words, when we remove an ox or a horse out of the veld and place it in a stable we must constantly expect during the four following weeks the appearance of blue ticks which have been picked up up to the day when the animal left the pasture. The female begins to lay her eggs about five days after she has left the host. This applies to the summer season only; in the winter it is postponed. The eggs hatch in the warmer season in about three to six weeks, and on an average after about thirty-six days; in the winter it will last a little longer. The young larvæ kept in glass bottles have been known to live six months; if they do not reach the host they die; on reaching the host they continue the life-cycle. During this time they sit on the grass; no food is obtained from the plant (as the popular belief is), therefore it follows that the blue tick must finally die, if after the above-stated lapse of time no host is found.

The Red-legged Tick.—The hatching period of the eggs of this tick

is in summer about thirty days as an average. We have known the young larvæ to live for a period of seven months. In the veld the young larvæ which find a host generally hide themselves in the interior of the ear and in the flanks, and soon begin to replete. They undergo the change from larvæ to nymphæ on the host. The nymphæ attach themselves near the place where the larvæ were, and replete themselves quickly, so that as early as ten days they may be replete and drop, but generally after an average period of fifteen days. The second moulting process takes place in the ground, and requires an average period of twenty-four days. In our experiments adult red-legged ticks have lived up to a year, and have after that time attached themselves to a beast; such longevity seems, however, to be the exception, and the usual period is less.

The Brown Ticks.—Under this name I include the Cape brown tick[1] and the shiny brown tick,[2] whose life-cycle is similar to that of the brown tick proper. In addition to these there are some more brown ticks which may act as carriers, but this has not yet been experimentally proved. The brown tick female, after it has been placed on a host, may be observed to drop already fully engorged on the fourth day, and by the end of a week it has usually left the host. The laying of eggs usually begins after six days. The hatching period averages in the warm season twenty-eight days; in the winter time the hatching takes several months. The young larvæ readily attach themselves to cattle and engorge rapidly, and may drop off the host in as brief a time as three days; after the lapse of eight days all engorged larvæ have dropped. The moulting process takes place in the ground, and averages twenty-one days. The shortest recorded period was sixteen days. The larvæ have in our experiments lived up to a period of seven months, and the nymphæ to six and a half months. For some days after moulting these creatures are not able to feed. They are colourless and weak, and refuse to bite if placed on animals. A few weeks later, however, they eagerly seek attachment when placed on the skin of a host. The nymphæ also require a period of about three days to engorge, and within a week have dropped off the animal. The adult ticks appear out of these nymphæ in summer-time after an average period of eighteen days. They, like larvæ and nymphæ, are almost colourless and very weak. A few days later they take the characteristic colour, become more vigorous, but require some time before they will readily attach themselves to a host. In our experiments the adults have been known to live up to a period of nine and a half months.

The Black-pitted Tick.[3]—The hatching period in this tick averages thirty days. The larvæ do not attach themselves readily to cattle or horses, but to other animals, and the intermediate stages are found on smaller animals. The first moulting usually takes place after twenty days, and the second one, from nymphæ to adult, after twenty-five days.

The Bont Tick.[4]—The female begins the laying of eggs in summer-time about two weeks after dropping from the host, but over three

[1] *Rhipicephalus capensis.*
[2] *R. nitens.*
[3] *R. simus.*
[4] *Amblyomma hebraeum.*

months may sometimes pass. The shortest hatching period is about ten weeks, but it may last as many months; it averages from four to six months. In our experiments larvæ have been known to live seven months. The young larvæ replete themselves on a host in from four to twenty days, and the majority always drop between the fifth and seventh day. The first moulting takes place after twenty-five days, but sometimes four months may pass. The nymphæ replete themselves on a new host in from four to twenty days. Nymphæ have been known in our experiments to live six months. The last moulting process takes place after about twenty-five days, the shortest, and one hundred and sixty days, the longest. The adult female drops from about the tenth to twentieth day after attaching. Adults have been known in our experiments to live up to a period of seven months.

The bont-legged tick[1] has not been discussed here as it has not yet been proved to act as a carrier of the disease.

Transmission of the Disease.—From the life-history, as outlined above, the following possibilities may be observed in the transmission of a disease.

Firstly, the transmission is effected by means of young larvæ, whose mothers have been sucking blood from infected animals. This has been known to be the case in redwater and spirochætosis; propagation of redwater by the blue tick is the principle modus; the larvæ of the brown tick may transmit redwater, and the larvæ of the red tick have proved to be hosts of spirochætosis.

Secondly, the transmission is effected by one of the succeeding stages, either by the nympha which infected itself as a larva, or by an adult which infected itself as a nympha. The red tick has been proved to transmit biliary fever of horses, spirochætosis, *Piroplasma mutans*, and *P. parvum* in the adult stage after it had been sucking blood of an immune or sick animal in the previous two stages. The group of brown ticks and the black-pitted tick transmit East Coast fever. It has been proved that the group of brown ticks and black-pitted ticks transmit the disease in their nymphal stage after they have been sucking blood from a sick animal in the larval stage. Further, the group of the brown ticks and the red-legged tick have been proved to transmit the disease in the adult stage after they have feeding in the nymphal stage on a sick animal. The adult brown tick has also been proved transmit *P. bigeminum* of redwater and *P. mutans*. The bont tick has been shown by Lounsbury to transmit heartwater in the nymphal stage, and in the adult stage after the larval and nymphal stages were fed on sick animals. It has further been proved that, contrary to the experience in East Coast fever, the brown tick can pass its nymphal stage on an animal not susceptible to heartwater without losing the infection it acquired in the larval stage, and transmit it in the adult stage to a susceptible animal. This is not the case in East Coast fever, where experience has shown that a tick after it has once bitten an animal can no longer transmit the disease. It must be emphasized here that the popular opinion that ticks pass from one animal to another and communicate the disease in this way is wrong. The destiny of females is to lay eggs, and of engorged larvæ and nymphæ to moult, and this makes it impossible

[1] *Hyalomma aegyptium.*

for them to reach new hosts before they have reached the next stage; therefore, only *males* can pass from animal to animal and can transmit the disease in this way. Indeed, males of any species of ticks which we have mentioned can live for many months on a host, but their peculiarity is to remain on that host, which they only leave accidentally when they are rubbed off; and since experiments have proved that once they have bitten they become harmless, such an accidental change of host does not come into consideration in the propagation of the disease, at least in East Coast fever.

The Hosts of the Ticks.—From our point of view, it is all-important to know which animal, in addition to those of which we have considered the diseases, may act as hosts for the ticks, and the following notes have been recorded concerning this:—

The blue tick has been found on equines and cattle, sheep, goats, dogs, and antelopes.

The red tick has been found to occur on equines, cattle, sheep, and goats, the reedbuck, other antelopes, and the Cape hare.

The brown tick has been found on cattle, equines, sheep, and goats, dogs, on various antelopes, and the Cape hare.

The black-pitted tick has been found on cattle, horses, sheep, goats, dogs, on the wild dog, the jackal, bushpig, and the hedgehog.

The bont tick has been found on cattle, horses, sheep and goats, dogs, the wild dog, on antelopes, and the ostrich.

The Prevalence of Ticks in the various Regions of the Country and in the Different Seasons.—Generally speaking the ticks are more frequent in the summer than in the winter-time. This stands to reason, since a certain moisture and temperature is required for the process of hatching and moulting. The various species related are, however, not equally distributed throughout the various parts of the country. We may state that the higher the altitude and the barer the veld, the less frequent are the ticks, hence the bushveld is practically the home of the tick, and the name "bosluis," as given by the Dutch farmer, indicates this. The blue tick may be considered as the most cosmopolitan tick of South Africa, and is found at all altitudes. Next to it is the red tick, which is met with in the high veld, but less frequently. The group of the brown ticks, especially the brown tick proper, is rarely met with on the plateau of the high veld, but it may be found there in protected valleys where the vegetation grows higher.

The same applies to the black-pitted tick. The bont tick is limited to the bushveld proper, and occurs only in places where the real bush is met with.

The Number of Ticks in Proportion to the Number of Cattle.—Under the most favourable conditions the number of ticks increase directly to the number of hosts found on a farm, thus the more stock is kept the more the ticks will increase, and under such conditions the ticks may become so troublesome that, apart from their *rôle* as carriers of disease, they do an enormous amount of damage by the withdrawal of blood from the stock and by the irritation they cause, which is generally known as "tick worry." Indeed, the ticks can kill an animal without even transmitting a disease. This we have seen in an experiment of ours, in which a horse was infested with blue ticks and which died as a result of this infestation, from acute anæmia, owing to the withdrawal of blood. Within three days 14 lb. weight of blue ticks

were collected which had dropped off this horse, and this amount only represented about half of the ticks which engorged themselves on it.

Influence of Cold.—We have stated that the presence of ticks is unequally distributed over high and low veld, and it may be expected that this fact finds its explanation through the temperature to which ticks are exposed in the high veld. Indeed, it is generally admitted that such is the case, and it may be so, for when such ticks as thrive best in the low veld are brought to the high veld by the removal of animals, the engorged females drop off, but do not develop there. But the cold in itself is not a barrier in prohibiting the development of blue and red ticks in the high veld, as experience proves; the temperature of freezing point only retarded the moulting of the nymphæ into adults, but did not kill them; it did not effect the blue larvæ at all; these latter only died when exposed for some time to a temperature considerably below freezing point.

Eradication of Ticks and Disease.—The facts quoted above indicate the ways and means by which we shall arrive at the eradication of ticks, and with them diseases. From a practical point of view we shall consider the two points separately, the eradication of ticks and consequently the eradication of disease.

The eradication of ticks can be attempted in several ways:—

(1) *Burning of Grass.*—Up to the present time the burning of grass has always been considered to be of great help for the destruction of ticks, and it stands to reason that such must be the case. Farmers have always distinguished burning of grass in season and out of season, to which they attribute, if not properly carried out, the cause of various diseases, such as redwater and gall-sickness. I believe that these observations have a certain foundation. But, nevertheless, the great importance attached to it as the cause of disease is generally exaggerated. Burning of grass undertaken at a time when most of the ticks have hatched and moulted and are sitting on the top of the grass must undoubtedly destroy them.

We note that the principal tick season is the summer, and with the cold tick life is more or less at a standstill. The ticks which, up to the end of the summer, have moulted and are sitting on the top of the grass, will still fasten themselves on to a passing host, and they are responsible for the tick life which we notice during the winter months. During the cold weather the laying of eggs and hatching is prolonged; if, therefore, at the beginning of the cold weather burning is undertaken, we would only reach those ticks sitting on the grass, and not those which sit underneath. These latter would, under the influence of the sun on the bare veld, probably hatch quicker, and when the young grass is shooting up, they will be found on the top of this grass. When, however, the burning of the grass is undertaken later in the season it would probably destroy the majority of the ticks, and the later the burning is undertaken the better the results would be. But grass burning alone, although carried out in the proper season, will not eradicate all the ticks, it only reduces their number.

Cattle which graze over the same veld maintain tick life, and ticks buried in the ground and not affected by the fire continue the cycle.

(2) *Dipping.*—Dipping has been made use of, and is still being made use of, as a very efficient means of destroying ticks, and undoubtedly it is so wherever it is carried out properly with an effective

dip. For our deliberations we accept the condition that the ticks will always be killed when the dip reaches them, and therefore we do not enter into the details of the efficiency of any particular dip, but consider the question of dipping as a whole. In valuing the effect of dipping, we must take into consideration the life-cycle of the species of tick with which we deal, and from this we can determine whether a method of dipping will enable us to destroy certain species of tick or not.

We have stated that the *blue tick* requires three to four weeks for the completion of its life-cycle on an animal. It follows, therefore, that one dipping within that time, say every third week, is quite sufficient to destroy the crop of ticks collected during that time. The blue tick larvæ only live up to a certain number of months, hardly exceeding eight; within the eight months an animal would constantly pick up these ticks, and by dipping these would be destroyed, and finally the period would arrive when an animal would no longer pick up blue ticks; the young larvæ which have not reached a host would have died in the meantime. Thus dipping for the blue tick should have almost a certain successful issue, always provided that no tick escapes the dip.

Referring to the *red tick*, we find that, in its life-cycle it seeks the host twice—once as a larva from which it moults into a nympha and remains there for about sixteen to twenty-one days before dropping; the second time as an adult, the female remaining on the host from six to ten days. It follows from this that a three-weekly dipping would not reach all the stages, and if it would be of any use for the destruction of the tick it would have to be repeated after at least every eighth day. Dipping continued in this way during the period the nymphæ, larvæ, and adults live in the grass, would finally lead to their eradication.

The Group of the Brown Ticks.—For the completion of their life-cycle they seek the host three times; as larvæ they replete in from three to five days. The same period is required as nymphæ, and the adult female requires about a week before it drops engorged to the ground. If the dipping is to be of any use for the destruction of brown ticks, it would have to be repeated every fourth day at least, and be continued as long as the intermediate stages can live in the grass.

In the case of the *bont tick*, which also requires three different feedings on an animal, the case is much similar to that of the brown tick. The larvæ remain on the animal from about four to five days, the nymphæ about the same period, and the adult about a fortnight. The dipping, to be effective, therefore, would have to be done at least about every four days.

From the above notes it may be seen that dipping as a *universal panacea* for the destruction of ticks must fail. It is impossible to dip any great number of animals every fourth day for a period of at least a year. *It will, however, be successful in the case of the eradication of the blue tick.*

(3) *Starving the Ticks.*—The third method of eradication of ticks is the starving process, and this must undoubtedly lead to success in every case where we are able to keep the place, for a sufficient length of time, free of such animals as act as hosts. We note that the blue tick will only live about eight months, therefore keeping a pasture free of animals for this period must starve out the ticks. If it is our inten-

tion to rid a farm of red, brown, and bont ticks, this period must be extended to over a year. From observations made in connection with East Coast fever, where the freeing of an area from the disease is probably due to starving out of the ticks, it can be deducted that a safe period is fourteen months, and we can accept that this period will free any farm from tick life *under the conditions of no host having access to it.* If it is only the intention of freeing a farm of ticks to a certain extent, that is to say, reducing the number of them and not eradicating them completely, the precautions need not necessarily be so strict.

Stock brought on to the tick-free piece of ground will naturally bring with them the ticks again, and they will increase in the usual manner, and after a few months they will be present in great numbers. But if it is our intention to get completely rid of the ticks, precautions must be taken not to bring ticks with the cattle into the clean veld. This can be done by dipping or spraying the animals and immediately removing them on to the clean farm, but it can also be done without dipping and spraying. For this purpose the cattle should be placed on a smaller piece of tick-free ground, sufficiently large to carry them for about four weeks, and should be kept there for this period.

We will call this the quarantine paddock. During this time all blue ticks will have dropped off, and if it is only intended to escape these, the removal of the clean beasts into the final clean area can be done. It is possible that within the four weeks, the group of the brown ticks, engorged larvæ, and nymphæ, which dropped off during the first days of the removal into the quarantine paddock, may develop to a succeeding stage (nymphæ or adult), in which they seek a new host, and then might be carried by the stock into the clean veld. It would therefore be advisable to transfer the quarantine after about three weeks to an adjoining clean piece, where the cattle would have to be kept another two or three weeks; there the remainder of the blue ticks would drop off, and no other new ticks could get on, and after this period the stock could safely be moved to a clean area. It is also possible that by the same procedure the bont tick would be got rid of, so that, theoretically speaking, it is within the range of possibility—without the use of dips or sprays—to get rid of all ticks. In practice this would have to be carried out by splitting the farms up into fenced paddocks, on which, after the stated period of about fourteen months, the movement of cattle could be commenced.

Eradication of Disease.—It is safe to conclude that the eradication of ticks means the eradication of disease. How this can be done has just been demonstrated. Under the conditions where the disease has broken out and no tick-free area is available, it cannot be made use of, and dipping, for the reasons given, would also fail. Here another method can be applied, namely, that of moving the stock out of the infected area into the non-infected one, arranging the movement so that the ticks which carry the infection and the animals which are infected remain behind. But this method can only be applied in those diseases where the immune animals do not act as a reservoir, such as in East Coast fever and heartwater.

East Coast Fever.—The principal carrier of this disease is the group of the brown tick, and occasionally the red tick, but from our point of view they have to be considered as equally harmful. Wherever possibility exists of the spread of East Coast fever, the following precautions should be taken: The cattle should be grazed on one particular

piece of the farm, and not indiscriminately all over; the piece should be fenced off, and under no conditions should cattle be kept there. Should East Coast fever now break out, the following procedure should be adhered to. Collect all the cattle and bring them on one particular place of the clean ground which has sufficient grass to feed these animals for about three weeks to twenty-four days. In this camp the careful selection of sick and healthy animals takes place. The sick animals are killed or sent back to the infected ground, and the healthy animals remain.

In order to detect the sick animals early enough, recourse should be taken to the thermometer, and all animals with a high temperature should be considered infected and turned out of the camp. After twenty-two to twenty-three days, the remaining healthy animals can now be moved into the clean area; they leave ticks and infection behind. The reason for this latter movement will find its explanation in the following facts. The average incubation period of East Coast fever is thirteen days, the longest (quite exceptional) twenty days. The average duration of the disease is twelve days, the longest twenty days (quite exceptional). Within twenty-two to twenty-three days it must therefore be possible, by means of the thermometer, to detect all infected animals. We have stated that the brown tick communicates the disease in either the nymphæ or adult stage. For moulting it requires at least sixteen days, but an average period of twenty-four days. We have to reckon with the sixteen days, and we know that usually after the moulting another eight days elapse before such ticks are able to reach the top of the grass and to bite; of this fact advantage must be taken to remove the cattle out of the area before these ticks are ready to bite, and that is about twenty-three days after moulting. The period of moulting in the red tick nymphæ is about twenty-four days, and here no danger would be expected. But even without thermometers, the moving of cattle is possible, namely, by making use of two quarantine camps, as explained before, leaving the animals in each camp for sixteen days. In thirty-two days all infected animals would have become visibly sick and could be excluded.

Heartwater.—If we want to trek out of a heartwater infected area, for the purpose of saving the stock not yet infected, two ways are open, depending upon what ground is available, and whether such ground is infected with bont ticks. Moving out of the infected area into ground where no bont ticks are present means that the disease must stop.

This has been the experience of many bushveld farmers who, with their stock, went down to the low country, and when troubled with heartwater simply moved back again to higher-lying ground. The fact was known for a long time, but the explanation could not be given since no connection between tick and disease was surmised. If, however, no ground is available free from bont ticks, then the same procedure has to be resorted to as explained in the case of East Coast fever. Moving on to a place which is known to be free of heartwater, remaining there just over the incubation period of the disease, and moving out of it before the ticks which dropped have moulted, and are capable of attaching themselves, for which two quarantines of three to four weeks each will be sufficient.

Eradication of Diseases in which the Animal acts as the Reservoir of the Virus.—This applies to ordinary redwater, biliary fever in horses, and to the three forms of gall-sickness mentioned before. Should any of these diseases break out amongst a lot of cattle and we want to try and save the majority of them by removing them out of the tick-infected area, we can only stop the disease if we move into a tick-free area, leaving all ticks behind. Then the disease must stop. This is hardly possible under present conditions, and when we move the animals out of a tick-infected area into an area free of the disease but tick-infected, we only postpone the appearance of the disease, but will not completely escape it. As soon as the sick and the immune animals reach the new area they will infect the ticks on that area, and after the period of hatching or moulting, as indicated above, the disease will continue. The question arises whether it will be possible to breed stock free of biliary fever as regards horses, of redwater and gall-sickness as regards cattle; we must emphatically say that it is possible if we start with a farm where, by previous starvation, as indicated above, all ticks have been killed, and where all hosts of such ticks are kept out by fencing. Farming with imported horses and cattle which have never suffered from biliary fever, redwater, or gall-sickness must be possible, provided that the farm is kept free of ticks, or even with the presence of ticks, provided that no such animals are on the farm which can act as a reservoir of the virus (immune horses and cattle). In other words, ticks may be allowed on such a farm if they have no chance of becoming infected. Naturally, such animals should never leave the place. They would contract the disease as soon as they were put into the veld where breeding of stock is not carried out under the same conditions. Breeding of stock free of infection from already infected stock can only be carried out under the conditions of absolutely excluding all tick life. It would have to be started by moving the stock through quarantine camps into an area previously cleaned of ticks, but in this case the ticks would, by all means, have to be kept out as long as the original lot of animals (the reservoirs) were present, because ticks introduced by any other kind of hosts would become infected with the disease of the immune animals, and in turn would communicate the disease to their progeny.

Thus, theoretically speaking, it would be possible to clean an area of ticks and to breed stock free of diseases out of imported and immune stock. The question now arises, would this be of any advantage at the present time? If one farmer carries out all the precautions and renders his farm absolutely free of ticks, and thus breeds animals free of disease, it would mean that such animals have no immunity against the diseases mentioned, and would contract them as soon as they were removed into an infected area. It is therefore not advisable at present to carry the tick destruction to such an extent that none would be left on a farm.

The notes given above will be useful in themselves to indicate to farmers how they can reduce the number of ticks. There is no risk of losing the immunity in animals if care is taken that a certain number of ticks always remain present on the farm. Theoretically speaking, from the possibilities as explained above, united action throughout South Africa would enable the country to be freed from such diseases as are carried by ticks. Perhaps a future generation will see the

advantage of doing so, but under present conditions it is necessary to reserve at least a small number of ticks. The Americans, however, have made up their minds to eradicate Texas fever by destroying the ticks, and their success will perhaps serve as a stimulus for South Africa to do likewise.

(*Transvaal Agricultural Journal.*)

INDIA CIVIL VETERINARY DEPARTMENT MEMOIR.

No. I.

Report of Research Work, 1908-9.

By Capt. HOLMES.

Muktesar.

In addition to the ordinary routine work of the laboratory, some very useful research work has been carried out at the Imperial Bacteriological Laboratory. From the report which has now been issued with the above title we abstract the following particulars:—

Horse Surra.—During the year an outbreak of this disease was investigated, and systematic research conducted as to the efficacy of various suggested lines of treatment. The drugs used included atoxyl alone, atoxyl and mercury, tartar emetic and mercury, methylene blue and mercury, methylene blue and atoxyl, iodoform alone, and mercury alone. In all cases the drugs were injected directly into the veins, and the treatment was continued for about two months. In every instance under the early treatment the animal improved in condition and the trypanosomes disappeared from the blood, but invariably either towards the latter period of treatment or some weeks after the injections had been discontinued the parasites reappeared, and the disease gained the ascendancy. The use of mercury intravenously seemed to have no beneficial effect. When used alone, it lowered the condition of the animal, and hastened a fatal issue. When tried in combination with other drugs such as atoxyl, tartar emetic and methylene blue, it evidently counteracted to an extent the beneficial effect of these drugs. Better results, however, were obtained by the use of atoxyl and orpiment, the former given by injection, and the latter in ball, as recommended by Laveran and Thiroux. In nine cases where the disease was in an early stage the treatment apparently effected a cure. Whether an equally good result can be obtained with animals in a later stage of the disease is yet to be proved. The best results of all, however, followed the combined use of atoxyl, orpiment and sodium arsenate, the animals showing no ill-effects from the treatment, and rapidly improving in condition.

Blackleg or Charbon Symptomatique.—This disease of young cattle is apparently as prevalent in India as it is in Great Britain, and vaccination has been widely practised for it, but has lately met with some disapproval on account of deaths occurring after the use of the vaccine. The average mortality after the vaccination has been less than 1 per cent., but the mortality has not been evenly distributed. It appears almost impossible to satisfactorily explain this fact, but it may depend on several conditions: the virulence of the vaccine may vary, the animals may have been weakly or diseased, or overdriven, or they may have had special predisposition. The difficulties that have to be contended with in introducing any new line of preventive inoculation in India are obviously increased when it is known that to the Hindoos

the life of the cow, as a rule, ranks almost higher than that of a human being. Consequently any measures of treatment adopted for their benefit must, above all considerations, be free from any risk of accidents. There is little doubt that the use of two vaccines, that is the so-called double vaccine, is the safest method, but it is certainly unpopular, because of the necessity for two operations. Holmes tested the ordinary single vaccines, including Blacklegoids, but his best results were obtained from a mixture of a first and second vaccine. This mixture protected in every case against an undoubtedly much more severe trial than natural infection. One very important and interesting fact emphasized is that the immunity acquired by treatment with vaccines does not set in before at least eight days, and that during that interval the inoculated animals are in a state of hypersusceptibility. Holmes also expresses the opinion that the pilule form for administration is safer than others.

Hæmorrhagic Septicæmia of Bovines.—This is a widespread and very fatal disease of bovines in India, affecting buffaloes as well as cattle. It is also said to fatally affect elephants in Burma. Two of the many local names by which it is known are "Galghotu" and "Gardu." Buffaloes are said to be more susceptible than cattle, and although nothing is said in the report about horses and donkeys being affected naturally, they have been shown to be very susceptible experimentally. During recent years heavy losses have been recorded, and consequently the veterinary department have devoted much time and energy to the discovery of some means of combating it, principally with preventive serum. The causal organism has been cultivated in broth, and the toxins produced have been obtained and experimented with. Small doses, when inoculated into the veins, proved rapidly fatal, but even larger doses injected under the skin caused no disturbance, and conferred immunity, lasting for some weeks. This short duration of immunity would only be serviceable to protect animals of a herd during a single outbreak, so further experiments were carried out to try and discover some means of conferring longer immunity. Several different sera were prepared and tested in various ways, and eventually a method was discovered which promises to be of immense service. It consists of injecting a serum obtained from hyper-immunized animals, and following in two days with an injection of strong virus, which would be sufficient to kill if not preceded by the serum. The nett result of these investigations up to the present is this: that animals can be rendered immune by two subcutaneous injections, with an interval of two days; and the immunity produced is of long duration. The process causes no rise of temperature or other symptoms. The serum, however, has no curative effect, hence the absolute necessity for prevention. It is hoped and expected that in the field the same good results will be obtained, because the amount of infective material by which the immunity was tested in the experiments must have been many times greater than an animal would be naturally exposed to.

Rinderpest.—The memoir also contains an interesting and instructive account of the work done concerning rinderpest. Holmes has found that for preventive purposes a single injection of serum is sufficient, provided two conditions are observed: first the dose must be protective, and secondly, the animal must be exposed to infection before that protective effect has worn off, that is to say, before ten days.

Reviews.

COWS, COW-HOUSES, AND MILK. By G. Mayall, M.R.C.V.S. Crown 8vo., pp. xii. + 102. Illustrations 24, including 6 plates. Cloth cover. London: Published by Messrs. Baillière, Tindall and Cox. Price 2s. 6d. net.

THE author has written this little book with the object of spreading knowledge as to the importance of cleanliness in the production of milk. It is intended for "the man in the street" as well as for the small farmer, who cannot afford to take a course at an agricultural college. Judged from that standpoint, he has produced a very handy, readable, and instructive little book. It deals with the general management of cows; with cow-houses, suggesting points to be borne well in mind in building fresh ones, and points in which the old cow-house may be brought more up to date and better fitted for the production of such an important article of diet as milk. There are many minor points in which we disagree with the author, and perhaps the most important one is as to the use of undecorticated cotton cake, which he appears to recommend. Personally, we feel very strongly against the use of it, and consider that decorticated cotton cake is immeasurably to be preferred, even though it costs much more. In our experience, it pays far better to give a less quantity of the better material, for disastrous results are by no means rare following the use of the undecorticated cotton cake.

The plates illustrating various breeds are very good and excellently reproduced, and the fittings (illustrated), as supplied by the St. Pancras Ironworks Co., Ltd., we know from experience to be thoroughly reliable.

POCKET BOOK OF VETERINARY PRACTICE. By A. von Rosenberg, D.V.S. 126 pages. Cloth cover. Price 75 cents, postage 4 cents. Published by Messrs. Boericke and Tafel, 1011, Arch Street, Philadelphia, Pa.

THE author of this booklet is an advocate of infinitesimal dosage in the treatment of diseases of animals, with frequent repetition. We agree that there has been a tendency to give enormous doses of drusg immediately animals are ill, especially to horses and cows, but he suggests the other extreme. Of the two extremes, that which he advocates is probably the less objectionable.

The first chapter consists of a "Code of Common Suggestive Diagnostic Symptoms." We will quote a few and let our readers judge of their value for themselves: Cheeks swollen—calculus in parotid duct; delirium—anthrax; forelegs flexed and resting on toe—rheumatism; mouth dry and hot—enteritis; mouth hot and clammy, erysipelas; pulse rapid but weak—anthrax; shaking—anthrax, gastritis.

The major portion of the booklet deals with various diseases and their treatment. This portion may be more useful, but the paragraph dealing with actinomycosis runs: "Treat surgically, with antiseptic precautions. Give internally aconite, alternated with nux vom., hepar sulph., arnica, echinacea." There is no mention of potassium iodide.

The binding is worthy of a better effort.

Translations.

TRICHORRHEXIS NODOSA.

By Professors POÉNARO and UDRISKY.

Trichorrhexis is an affection of the hair which attacks all animals possessing long and rigid hair like that of the mane, tail, head, beard, and moustache. The illness is characterized by the development of ash-grey spots on the surface of the stem of the hair, of nodular aspect, and at the level of which the hair breaks, leaving on this region of the skin spots having the aspect of trichophytic spots. This affection is hardly noticed and very incompletely described in the annals of veterinary medicine.

In human medicine numerous scientific researches on the subject have been made during the last few years, not only from the clinical point of view, but also from the etiological standpoint. However, up to now the pathogeny of the malady has not been decided. We are still obliged to read all the theories about the cause written in human medicine. Some believe in trophoneurosis; others in a constitutional malady; Sabaurand in mechanical causes; Hodara in a bacillus; De Keyser, Spiegler, Essen, and Marcusfeld in a pathogenic micrococcus. Trofino says he has observed the malady in two-thirds of the horses in a brigade of artillery, and he identifies it as the human trichorrhexis nodosa described by Kaposi.

Observation.—We have had occasion to examine a horse whose tail-hairs fell out for some months, leaving regions resembling trichophytic plaques. On examining the hair one sees on its surface certain ashy spots, at the level of which it enlarges and forms a node.

However, these thickenings do not represent veritable nodes; but the hair being, as it were, teased out or unravelled at these places, appears larger, like a string whose strands are disintegrated at certain points. The ashy colour is due to disagregation of the cells of the medullary stratum, their disappearance and non-preservation of normal form.

The cells of the epidermis having the form of a scale are partly desquamated; *the cells of the cortical substance*, fusiform and intimately bound together in the normal state, are dissociated and partially deprived of pigmented granulations in trichorrhexia (see fig.) *The cells of the medullary stratum* which in the physiological state are polyhedric and ranged at the centre of the hair like a cylindrical column, are dissociated, decolorized, and in great part gone; cortical cells replace the medullary cells at the level of the false nodes, and by their dissociation give to the hair the aspect of two forceps united, augmenting the volume of the hair at the level of the nodes.

Our microbiological researches have been made after the following method: The hairs affected with trichorrhexis were washed several times in sterilized water; they were afterwards fixed in a culture medium, agar, gelatine, potato, bouillon, &c., employing the aerobic and anaerobic methods. On these culture media numerous colonies of very varied microbes developed; sometimes staphylococci, streptococci, bacilli, at other times a vegetal parasite resembling in a measure *Trichophyton tonsurans*. None of these microbes or parasites would

reproduce the malady, not even when rubbed into the shaved skin of horses or guinea-pigs.

If the cause is mechanical this ought to be confined to the grown hair. Immediately after hair has been shaved it ought to be reproduced normally, but this does not happen; the hair grows just the same, the nodes being reproduced.

To our mind the principal cause *resides in the regenerator (Malpighian) epithelium of the hair, which caps the papilla of the bulb, and which, by proliferation of the cells of this epithelium, makes the hair grow.* The vessels of the papillæ are anæmic, the cells of the medullary stratum are abnormally keratinized, deprived of pigmentary granulations, and neither preserve their situation nor normal form. The cells of the cortical layer, equally under the influence of insufficient and abnormal nutrition, do not preserve their normal cohesion, not only between themselves, but with regard to the medullary stratum.

There exists, then, a failure of adhesion between the layers, which later facilitates dissociation of the cells of all the layers of the hair; dissociation which makes the hair larger in these regions at the same time as it takes on the ashy colour.

[Block for this article kindly lent by the publishers of "Walsh's Diseases of the Hair." It shows precisely the same condition as the original illustration which it was unfortunately not possible to reproduce.—Ed. *V. J.*]

(*Arhiva Veterinaria.*)

BENZENE POISONING IN A DOG.

By CHIEF VETERINARY SURGEON GUHRAUER.

In No. 4 of the *Zeitschrift für Veterinärkunde* for January 28, 1909, on page 72, attention is called to benzene poisoning in men. I had the opportunity of noticing such a mishap in the dog which may be of general interest.

A fox-terrier dog, aged 10, always had a very rough and dirty coat which washing with soap and water never improved. Benzene was resorted to in order to remove the spots, and the animal was soaked with it. The result was that the coat remained smutty, but the dog could not stand and looked like expiring.

On my arrival I found the dog lying unconscious in his abode with his feet stretched out; breathing accelerated and irregular, heart beats weak, pulse scarcely perceptible at the femoral artery. From these symptoms I did not give a hopeful prognosis. Black coffee with cognac was given, and afterwards a camphor oil injection. The dog showed improvement after two hours. The great listlessness had passed away, and the limbs were moved. After a further two

hours and another teaspoonful of coffee and brandy the dog was able to stand up. On the following day he seemed completely recovered

Here, just as in poisoning in men by benzene, there was severe unconsciousness and heart weakness, which, however, passed away in a short time.

(*Zeitschrift für Veterinärkunde*).

CONCUSSION (SHOCK) NEUROSIS IN THE HORSE AND DOG.

By Dr. H. JAKOB,

Munich.

With the rapid additions to modern means of transit in great cities the number of the above-mentioned accidents to man and beast has increased. In very many cases one sees no wound but a severe shock to the whole body, which in certain circumstances may be recognized as a nervous affection for some days. Jakob designates this concussion neurosis, corresponding to the traumatic neurosis of human medicine. He had the opportunity of seeing two horses that had been in contact with an electric tram and five dogs that had been in collision with automobiles. The horses were very much excited, and could with difficulty be kept going; in the stable the excitability declined. The look remained fixed for a long time; the hair was often wet with sweat. The animals would not lie down in the stable at first, but later they reclined with the greatest caution and anxiety, but at the slightest noise the whole body quivered. Thus the flow of water from a hose-pipe caused violent tremors of the muscles. Urine and dung were irregularly voided, and the heart's activity declined. Both horses recovered after two months, but they were not so quiet and docile as formerly.

The dogs were ill in a similar way; they were timid and frightened, shy looks, and inactive. When called they came along with arched backs; they yelped and showed severe trembling, lasting several minutes. Snapping and biting, they would withdraw to their retreats. When free in a busy street the restlessness increased; on the approach of a motor they fled. After several weeks they got better, but their earlier liveliness and adroitness were impaired.

(*Berliner Tierärztliche Wochenschrift.*)

ORCHITIS IN THREE BULLS CAUSED BY THE MICROBE OF INFECTIOUS VAGINITIS.

By RAEBIGER.

A bull, aged 2, had been used to serve three cows. Four days after the first service the right testicle increased in size, and reached the dimensions of a child's head in ten days. Appetite was suspended; rectal temperature, 41·4° C.; pulse, 140; testicular cord tumefied, and the region very painful.

The organ was suspended in damp wadding, and 20 grm. of antifebrin given daily, and subcutaneous injections of iodide of sodium.

The general and local state of the animal improved, and he was sent to the butcher.

A month had hardly elapsed before another case of orchitis occurred in the same stable and presented the same signs. Thirty-eight cows and ten heifers were examined and found to be affected with contagious vaginitis. Raebiger advised the owner to cut the hairs off the sheath and wash the cavity with a solution of lysol immediately after the service. The attendant neglected these precautions, and another bull was attacked. The animal was cured, and again used after disinfection of the sheath and penis.

(*Revue Générale de Médecine Vétérinaire.*)

THE TREATMENT OF MAMMITIS IN THE COW.

By M. L. BIGOTEAU,

Veterinary Surgeon of Ouzouer-le-Marché.

In a note published in this Journal (*Revue Générale de Médecine Vétérinaire*) in 1905, I made known the results of systematic treatment of mammitis of the cow by injections of boricated water. One injects into the sinus of each affected quarter 120 to 180 grm. of a 3 per cent. boric acid solution. The solution is made with boiling water. The liquid is injected as it is in summer; in winter it is kept at a temperature of 20° to 25° C. At the same time a purgative is given internally (mixture of sulphate of soda and Barbadoes aloes). The inflamed quarters are milked out every three or four hours until cured. The boricated injection is not renewed except in rare cases, when the milk continues to be altered. In these instances a second injection is made after three or four days.

The method has since been employed in France and foreign countries, in general with the same success. For successful treatment it ought to be practised early. Another condition is also *necessary*, and neglect of it has doubtless caused failure in not a few cases. For favourable boricated injection *the inflamed quarter must be completely emptied before receiving the injection.*

The usual milker, even though expert, is generally incapable of completely emptying the contents of the reservoirs. I have hundreds of times observed that when the milker declares that the gland is empty, and that nothing more can be drawn, that a clot filling the collecting sinus can be extracted. This previous operation constitutes the *tour de main* which decides the success of intervention. One knows that the reservoir is situated inside at the origin of the teat, levelled out under the skin. One of the first effects of infection consists in coagulation of the collected milk. It is this clot that must be extracted. It is done by patient work of dissociation; it is accomplished by [repeated pressure from above to below with the thumb and one or two fingers, so as to break up and detach the coagulated mass. This being done, one catches hold of the base of the teat with the hand—which the milker never does—and one operates by graduated regular pressure until the extremity is free. Renewing this procedure needed to dissociate the clot, one finishes by extracting the contents of the sinus. Sometimes a pasty mass is obtained about

the size of a nut. One knows that the operation has succeeded when the cutaneous region corresponding to the sinus, previously stretched, declines and gives the soft feel of a slightly œdematous tissue. The forgetting of this simple precaution leads to the majority of unsuccessful treatments, for I believe that every mammitis of the cow is amenable to boricated medication in the conditions indicated.

(*Revue Générale de Médecine Vétérinaire.*)

OTITIS EXTERNA IN THE HORSE.

By District Veterinary-Surgeon Dr. OPPERMANN

Wanzleben.

Whilst otitis externa is not at all uncommon in the dog and is frequently recorded in literature, the same cannot be said of the horse. On this account five cases noticed by me during last summer and autumn seem worth describing. I was asked by the owner of a hackney to bleed him, as the patient showed signs of plethora. I gathered that as soon as the horse warmed to his work that he shook his head violently, tossed it up and down, would not answer to the reins, had an unruly or one-sided gait, as "if he was stupid."

I noticed that the bridle fitted all right in all the horses. I could not discover any injuries or tumours on the ear muscles; but the internal wall contained a thick sticky layer of dirt. Rubbing and slight massage of the root of the ear gave the animal visible ease. There was no smacking of the lips, as is often the case with the dog.

After diagnosis of otitis externa I had the external ear thoroughly and cautiously cleansed with luke-warm water, afterwards rinsed out with pure warm water, and swabbed out and irrigated with about a 3 per cent. spirituous solution of resorcin.

In four cases the bad symptoms disappeared in from eight to fourteen days. In one horse that had suffered for several months, and had in consequence become very thin, the shaking of the head did not cease after the above treatment, but it improved. In this case daily instillation of anæsthesia (Kitsert) 3 parts, and rectified spirit and distilled water, of each 50 parts (a teaspoonful daily poured in), soon effected a cure.

All the above cases occurred in fine bred horses, and I conjecture that in these the internal surface of the ear muscle does not produce such long and thick hair as that of heavy and ill-bred horses. The thicker and longer the hair the better and more completely penetrating dust is caught and excluded from the ear cavity. The latter mixed with the secretions from the glands of the ear forms thick oily masses, which easily set up irritation of the external ear.

(*Deutsche Tierärztliche Wochenschrift.*)

Correspondence.

To the Editors of the VETERINARY JOURNAL.

SIRS,—I have read a note taken from the *Recueil de Médecine Vétérinaire* of September, 1909, concerning the veterinary profession of the United States.

There it is stated that, in the United States of America, only those veterinary surgeons will be employed who have qualified in the English-speaking schools, with the one exception of those who have earned their diploma in the Veterinary School of Lemburg. The first stipulation is reasonable, but the cause of the second statement cannot be understood.

I know very little of the Lemburg School, and I do not feel in a position to adequately defend the rest of the European schools. I know at least, however, that other schools, and especially our school at Budapest, rank as high as the School of Lemburg. Perhaps there was no Hungarian veterinary surgeon in the service of the United States, but if there were I am sure he would do very good service.

Let us hope that they will pay more attention to the brother schools of Europe in the future.

Yours faithfully,

A. LÁSZLÓ,
Veterinary Surgeon.

Fuzesgyarmat,
Bekes M., Hungary,
January 8, 1910.

[Unfortunately we have not seen the note referred to by Mr. László and we do not know what it is that the English-speaking and the Lemburg men are to be employed for. Does it refer to the public services or to private practice? We do not know of the law or regulation dealing with this matter, and perhaps one of our American readers will enlighten us. However, we agree with our correspondent that graduates of Budapest and other European colleges are quite as competent as those of Lemburg.—EDS., *V.J.*]

Books and Periodicals, &c., Received.

Bulletin of the Sleeping Sickness Bureau; Rhodesia Agricultural Journal; The History of the Dunmow Flitch; Bulletins of the Bureau of Animal Industry; Board of Agriculture and Fisheries Department of Agriculture and Technical Instruction for Ireland; The Age (Melbourne).

Letters and Communications, &c.

The Merieux Institute; G. Mayall; D. Dey; A. László; A. Wilson; T. Runciman.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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